Some Fiscal Aspects

of

Public Education in American Cities

By

Edward Charles Elliott, A.M.

Submitted in Partial Fulfilment of the Requirements
for the Degree of Doctor of Philosophy
in the Faculty of Philosophy
Columbia University

1905

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Some Fiscal Aspects of Public Education in American Cities

I. Introduction

Twofold Aspect of Present Educational Thought.—There are at the present time two well-defined tendencies in our public educational thought and activity, which may be designated as the *scientific* and the *economic*. At the outset, it may be well to anticipate the possible obscureness or confusion arising from the use of these terms, possessing, as they do, meanings of both variable content and application.

The Scientific Aspect of Education.—The so-called scientific spirit is as old as modern science, and its invasion of the field of educational activity has been as extended and as rapid as those sciences, fundamental and cognate to education, have developed to act as guides and leaders for the advance.

This scientific aspect, as it concerns organized public education, is best defined by the many and varied efforts of the day to evaluate the results of educational endeavor; to measure in terms of some standard unit the relation between effort and result; to give to education, in a degree at least, some of the exactitude and precision which have grown up within the physical, biological, and social sciences. It has, as it were, assumed three phases. On the one hand is the child; on the other, the teeming and multiplex super-organism of society; between, stands the school as an adapting institution. Each of these primary elements of the educational process has been, and

is being, subjected to that searching inquiry, criticism and judgment characteristic of the scientific attitude, in order that there may be wrought into the structure of the organization, curricula, and aim of the school the established fundamental principles of human development and social efficiency. Every concrete study and investigation of the ever-changing and developing physical, mental, moral, and social capacities of the child; every attempt to define and estimate the working efficiency of the practices of the school, by means of more adequate standards; every measurement of the results of the school in terms of those values established in the social medium; every critical interpretation of the educational method and organization—the number and frequency of these during recent years furnish ample evidence of the ceaseless and ever-spreading scientific activity that seeks a rational purpose beneath educational practices and ideals, which, too frequently in the past, have been grounded in tradition, prejudice, or social inertia.[1]

The Economic Aspect of Education.—The application of the word "economic" to education may appear to be of doubtful validity or propriety. The materialistic elements and biased political associations of the word seem to have prevented its intrusion into the terminology of education; yet there are ample reasons to warrant the belief that there is soon to be developed a definite field of knowledge to which may be applied, with aptness as well as precision, the term "economics of education."

In a wide sense, the scientific aspect of education is inclusive of the economic aspect. Economics as a science, and in its broadest significance, comprehends the laws of the correlation and conservation of social energy. In this sense, all applications of scientific method to each of the threefold phases of public education have a final economic aspect; for every series of

[1] The argument here is not at all concerned with the doubtful discussion as to the existence of a "science" of education. Any attempt to establish a completer individuality for educational knowledge is likely to end in specious contention. However, the application of *scientific method* to the problems of education is another and different matter. Through this means will the problems be carried toward a rational, logical, and unbiased solution. Indeed, by it also, the problems themselves will become more clearly defined as the study of the appropriate phenomena progresses.

observations upon the workings of the developing mental, bodily or moral organization of the learning child, every alteration of administrative system and every revision of curricula have as a goal the influencing and improvement of the conditions under which the educational process may take place with the least of retardation, and with a minimum of waste of effort or energy. This is necessarily true if such observations are conducted above the plane of mere scientific dilettanteism, and if suggested administrative and instructional changes are posited as results of rational inquiry.

In its larger meaning, too, all education—especially all schemes for national public education, representing as they do the supreme conscious effort of peoples for the conservation and correlation of their social forces and for the perpetuation of their social traditions—has a definite economic significance. As the wealth, enlightenment, ideals and progressive character of peoples are determined in a large measure by their opportunities for education, so are their opportunities for education fixed by the material and ethical elements of their existence.[1]

Public Education as a Producer and Consumer of Social Energy. —As an instrumentality for the development of individual wholeness, for effecting the amalgamation and cohesion of diverse racial and cultural elements into a national unity, and for directing social energy towards social progress, we of the United States have doubted but little the total productiveness of our plan of education. Our faith has been instinctive rather than rational, for we have always lacked any definite standards by means of which its individual or social results could be tested with any degree of accuracy.

Qualitatively, through the roughly and ill constructed subjective standards of public opinion, it has been assumed that every investment of public funds in public education yielded an immeasurable dividend in the form of an enlightened, moral, and efficient citizenship.

Quantitatively, these dividends are almost impossible of measurement. Aside from the rather inadequate standards, established by statistical investigations of the illiteracy, crime,

[1] Seager, H. R., *Introduction to Economics*, pp. 233 *ff.*, gives a short, yet definite, exposition of the reciprocal relation of education and economic condition.

poverty, and earning capacity of our population, we have had no gauges with which to determine in any exact or satisfactory manner the amount of those elements of culture and worth, entering into individual and social values, which could be traced back to the influence of public education. This has been necessarily so, and there will perhaps always be a total absence of standard values in estimating the larger effectiveness of public education. For the forces generated and directed by organized education cannot be subjected to those modes of measurement applicable to physical forces which display a constancy and universality foreign to the activities of education, functioning as these latter do under the widely varying conditions of race and individual capacity, and of economic state and class ideals which arise in natural consequence of our democracy and freedom of competition.

On the other hand, the recognition of this phase of the economic aspect of the educational process, *as a problem*, is the first condition for the application of a scientific method for its solution. As our knowledge of the mental and physical capacities of individuals increases, and as our recognition of social necessities is expanded, we shall be enabled to accommodate and direct educational effort toward the largest, most economical and efficient ends.

Throughout whatever recognition and knowledge we have had in the past of the values derived from public education, and in most of the enthusiastic efforts to increase these values, the school has been viewed almost entirely as a *producer* [1] of social efficiency. While not entirely disregarded, the thought of public education as a *consumer* of social energy has not yet been developed in a manner likely to give a clear and accurate notion of its economic cost. The vast and increasing expenditures for the support of public education are, however, directing more and more the attention of publicists and those charged with the administration of the affairs of the public schools to the necessity of the possession of more reliable and accurate knowledge concerning the cost of this education we have established.

[1] I recognize the objections to the use of this term *producer*. Its real meaning will, I think, be readily comprehended. Its use enables me to carry out what seems to be a valuable analogy from economic science.

While the real cost of public education is, in some respects, as difficult of accurate measurement as are its results, there are certain objective phenomena by the measurement of which a more or less accurate statement of the consuming capacity of the public schools can be made. Even when limited to the amount of public money devoted to public education—and this by no means represents the total cost of such education[1]—our present-day notions of the cost of education are of a crude and inaccurate kind. It might be said in all truth that we do not know how much we are paying for public education, in spite of the overwhelming mass of apparently reliable information and statistics. The commonplace of "millions spent" and "millions spending" has benumbed our economic sense, and that clown of statistics—the average—has been made to perform grotesque antics to please and win the applause of both the unthinking and those inspired with ulterior motives.

Whenever doubt has arisen concerning the effective working of our educational plan, its shortcomings have been felt in an indefinite and vague manner. Not infrequently reforms are attempted through the transformation of the mode of legal and administrative control, or by means of remodelled curricula. In the main, however, one or the other of two standard remedies is generally proposed to-day to remove any recognized weaknesses of the plan and to provide for its rapidly expanding activities and functions: better prepared and more able teachers, and a more generous and adequate support. In our present social conditions the application of the first of these is recognized as being conditioned by the second. "More money" has become the banner word of those who, either through honesty of conviction or an unweening enthusiasm, hope to have realized within, and from, the public school those ideals and results consistent with its primary importance as a conservator of national efficiency.[2]

Public Education and Public Taxation. — However well-grounded in our American polity the idea of public taxation for

[1] See Giddings, F. H., *The Legal Aspect of Compulsory Education, Proceedings, National Educational Association,* 1905, for pertinent suggestions regarding the real social and economic cost of compulsory education.

[2] See Eliot, C. W., *More Money for the Public Schools,* for a virile and timely statement concerning this point.

the support of public education has become, perhaps *the* present most fundamental condition of the growth and efficiency of this distinctly American institution is the question of the rational limitation of the amount of public money to be devoted to it. This question is assuming a wider public interest each year. Aside from the increased demands for support due to mere numerical growth, the extension of the recognized function of the public school, and the numerous well-directed efforts to improve its effectiveness through the provision of more adequate facilities, have served to increase many-fold the financial burdens necessary to the institution and success of the reforms. To say that the burden has been borne ungrudgingly by the people would be a mere commonplace. To assume that twice the burden *could* be borne might be presumptuous.

The influence of persistent bodies of teachers,[1] who have come to the realization of the idea that justice and adequacy of teachers' salaries and of school support will come only through justice and equality in taxation, and of certain definite studies and investigations [2] of the financial conditions surrounding the public schools in various parts of the country, has stimulated both professional and public activity regarding the problem of the financial support of the public schools.

Summary.—The dominating aspects of educational thought and activity to-day may be characterized as the scientific and the economic. Broadly speaking, the first of these is inclusive of the second. The economic aspect is becoming, however, more and more specialized and separable from the scientific.

[1] The recent well-known campaign of the Chicago Teachers' Federation is an example of such activity, perhaps the most unique in American educational history.

[2] *Committee on Taxation as Related to Public Education.* Appointed at the meeting of the National Educational Association, Minneapolis, 1902. (*Proc. N. E. A.*, p. 312.) Final report submitted at meeting of National Educational Association, July, 1905 (86 pp.).

Committee on Salaries, Tenure, and Pensions of Public School Teachers in the United States. Appointed at the meeting of the National Educational Association, Boston, 1903. (*Proc. N. E. A.*, 1903, p. 308.) Preliminary report. (*Proc. N. E. A.*, 1904, pp. 370 *ff.*) Final report submitted at meeting of National Educational Association, July, 1905 (458 pp.).

Report of Committee on Taxation and Teachers' Salaries. Indiana State Teachers Association, 1904 (126 pp.).

In the life of a people an organized system of public education may be viewed as a *producer* of social efficiency and as a *consumer* of social energy. The most important problem before American education to-day is that of adequate support. There it needed, however, fuller and better knowledge of the actual consuming capacity of public education before the present support can be intelligently increased.

Aim of the Present Study.—The form of all education, and of all public education in particular, is cast in a mould of social ideals. In turn, it acts to shape new ideals of new generations. The influence and social value of these ideals cannot be readily subjected to a process of scientific measurement. On the other hand, it is possible to state in more or less exact terms some of those characteristics which mark contemporaneous public education as a consumer of social energy, valuing social energy in terms of the amount of public funds given over to the support of public education.

It is toward this economic aspect of education that the following study will be devoted, particularly as concerns the fiscal position of public education in American cities.

II. Public Education and the American City [1]

Public Education and the Scope of Modern Municipal Needs and Activities.—Undoubtedly, the most significant social phenomenon of the last half century has been the concentration of population in urban centres.[2] As a direct product of modern industrial development, the city has given rise to a multitude of new and unsolved social and political problems. Without undue exaggeration it may be said that the social and political problems of the nation are becoming localized in those of the cities. Among these problems, not the least in far-reaching and fundamental importance is that of public education. How

[1] The most satisfactory study we have upon this topic is Rollins, Frank, *School Administration in Municipal Government*, in *Columbia University Contributions to Philosophy, Psychology, and Education*, vol. xi.: see also Goodnow, F. J., *City Government in the United States*, Chap. XI., pp. 262–273.

[2] See Weber, A. F., *The Growth of Cities in the Nineteenth Century*, *Columbia University Studies in History, Economics, and Public Law*, vol. xi., for a comprehensive treatment of this subject.

to organize and administer a scheme of public education which will provide an adequate training and instruction, both in *kind* and *amount*, for the children of the cities, has become, and is yearly becoming more so, a paramount social issue.

Education, however, presents but one of the problems of modern municipal life. Not only are the children to be educated; property and life must be protected against crime, fire, and disease; an ample and uncontaminated water supply must be maintained; ease and safety of communication must be established; the needy, the unfortunate, and the dependent must be provided for; a social responsibility for the cultural welfare of all individuals must be recognized; above all, has come the demand for a form of administrative control at once responsive to the public mind and likewise efficient and conscious of a personal responsibility. Thus there have developed, co-ordinate with education, the almost equally important requisites of municipal life—efficient administrative systems, police and fire departments, courts of justice, jails and workhouses, health and inspection departments, street, sewer, lighting and water departments, hospitals, parks, and gardens—the list might be expanded many-fold, so extended have become the needs and the scope of modern municipal life and activity.

Increased Importance of Municipal Fiscal Problems.—For the satisfaction of its local needs the municipal corporation has been enabled to utilize, with few exceptions [1] and with numerous restrictions,[2] the right of local taxation conferred upon it by the state. The history of most American cities might be reflected in an account of their financial and taxing experience. Their life, prosperity, and intensive development have been bound up in the official wisdom and honesty employed in the use of their public funds.

The corollary of the expansion of municipal life has been the remarkable increase in municipal revenues, expenditures, and debts, the latter to-day exceeding in magnitude those of the Federal Government.[3] These revenues, in the main derived

[1] For example, the prohibition against local taxation for public education as has existed in several southern states.

[2] Minimum and maximum tax levies, limitations in the taxation of corporate and franchise values, etc.

[3] Aggregate of interest and non-interest bearing debt of the United

from direct taxation, have laid upon property as the chief subject of taxation a burden which causes even the enthusiast to hesitate in his demands for the continued expansion and intension of those social activities that are already, or that are thought fit to be, subject to public control and utilization.

Committed as we are in this democracy to a system of public education supported almost entirely from local taxation, the solution of the educational problem, in its final analysis, has become largely a matter of adequate financial support.

State Control of Municipal Education.—The American city has not developed independent of state legislation and government control.[1] In fact, under the influence of perverse political methods, on part of city and state alike, the American city has been brought under state domination. "Local autonomy" has become a figure of speech in many respects. However, it is over education that the authority of the state has been exercised with increasing force.[2] In the financial, as well as the political history and development of cities in America, education has held a somewhat peculiar position. In American polity, education has always been considered as a social activity, the ultimate control and administration of which was properly a state function. This has been and necessarily needs to continue to be a foundation principle of our educational scheme.

Partly as a heritage of our early semi-ecclesiastical control of education, and partly as a result of an early untutored political experience in the direction of educational affairs, local educational jurisdictions have grown up independent of the municipal jurisdictions, and frequently, when territorially coincident with

States Government Dec. 1, 1902 (*Monthly Summary of Commerce and Finance of the United States*, Treasury Department, December, 1902, p. 843)..... $1,311,574,059.

Total debt obligation of cities (160) in United States, above 25,000 population, at close of fiscal year 1902 (Bulletin No. 20, 1905, United States Bureau of the Census)..... $1,312,268,324. Of the latter amount $1,172,798,788 was in the form of municipal bonds.

[1] Goodnow, F. J., *City Government in the United States*. Chap. IV., The Position of the City in the United States, pp. 69–88; Chap. V., State Control of Cities. Also his *Municipal Problems*, Chap. II, pp. 27–32, 63–89.

[2] Webster, R. H., *Recent Centralizing Tendencies in State Educational Administration*, gives a very satisfactory exposition of the present conditions.

the municipality, possess powers and authorities apart from the local civil administrative system. Thus the study of education, as a *municipal* activity, has been rendered extremely difficult. Especially complicated has become the fiscal aspect of education. In many states, boards of education in cities possess the power to levy and collect taxes, and to expend their funds wholly independent of the municipal authority.

The most important element in this complication has been the system of state subsidies of local education, which has grown up coincident with the extension of the control of the state over all education within its borders. The state subsidy, constructed as an instrument for the encouragement of the development of public education, and for the equalization of educational opportunity, serves in many respects to hide from our view the exact nature and extent of local adaptation and responsibility for support of public education.[1]

Through a combination of the influences arising from the special character of education itself, through the frequently demonstrated necessity of removing educational control from the rule of partisan politics, and through the exercise of the control of the state through its subsidies, there has been in the cities of most of our states a tendency toward the isolation, either artificial, or real and legal, of education in the field of municipal activity. In general this isolation in the past has been a necessity for the development of public education amid the ofttimes antagonistic political, social, or religious forces.

Fiscal Isolation of Municipal Education.—One of the chief supplementary results of this administrative isolation of public education in cities has been a sort of fiscal isolation. Statistics relative to the cost of education have been eagerly sought by those interested in this economic aspect of educational administration. Nowhere has any careful attempt been made to determine the true fiscal position of education in our cities, by which is meant the relation which educational revenues and expen-

[1] The complex systems for the support of public education in force in most of our states have rendered extremely difficult the obtaining of a correct notion regarding the relation between the state and local support. The statistics of the receipts of public schools of cities, compiled annually by the United States Commissioner of Education, wherein it is sought to differentiate state, county, and local receipts (Table VIII., pp. 1446–1458 of the Report for 1903) are exceedingly inaccurate and misleading.

ditures bear to those other revenues and expenditures deemed essential to the conditions of municipal life. The determination of these relationships appears to be a prerequisite to a more exact knowledge of educational finance itself, as well as to the extension of our present ideas relating to the social position and economic importance of the public school in the newer conditions of urban life.

Unity of Municipal Life.—There is growing to-day, though, a new conception of the place and function of education within the organic life of the municipality. The central notion of this later concept is that of the unification of the various forces which go to make up the municipal life, and of the elimination of those forces tending to disintegrate the essential elements of the wholeness of the community life. This thought of unity is, as yet, in the nature of an ideal. Prevailing political methods, traditional prejudices, and social inertness must be overcome and a keen sense of civic obligation developed before this unity can be realized. The doctrine which says that, "one of the chief dangers which menaces the security of our citizenship and the high purposes of the American state, in my judgment, is the mingling of municipal and educational functions,"[1] or that "while the state must accomplish its work for education largely through municipal agents, it must also prevent, so far as possible, any mixing of local politics with educational interests. *To this end the development of education must be made as independent as possible of other departments of municipal government,*"[2] must cease to be a working principle if our modern city life is to attain that efficiency demanded and desirable for real social progress.

Education, although primarily of state concern, is none the less a municipal responsibility, the complete realization of which will come only when it has been assigned its proper place within the scope of the whole municipal life.

[1] Draper, A. S., *Function of the State Touching Education*, in *Ed. Rev.*, xv. (1898), p. 109.

[2] Rollins, Frank. *Op. cit.*, p. 18. The italics are mine. In one sense the first statement of the quotation is true. It is difficult, however, to find justification from the arguments adduced for the general conclusions which Dr. Rollins reaches regarding the absolute supremacy of the state over municipal education.

III. Basis and Method of Investigation

At the commencement of this study, the two factors of most importance to be determined were the *basis* upon which, and the *method* by which, the investigation was to be conducted. The first would define the scope and variety of the data subjected to analysis, a matter of no small significance in this particular case. Through the latter, it was desired to get beyond the unsatisfactory and limited conclusions attached to current observations of the financial aspect of municipal school administration.

Financial Statistics of Cities.—As the initial aim was to obtain a view of public education in cities through the perspective of their total fiscal activity, the first requisite was to obtain the statistical data reflecting this activity. This was thought to be contained in the ordinary official municipal reports.

Without much difficulty there were obtained the annual financial reports of 120 of the 156 towns and cities in the states of New York, Connecticut, Rhode Island, Massachusetts, Vermont, New Hampshire, and Maine, possessing over 8000 population, according to the Census of 1900. This particular territory was selected because of its approximate homogeneous character, and because of the recognized custom of most of the towns and cities contained therein of issuing for distribution annual reports covering the scope of the various municipal activities. The promptness and courtesy of the various officials to whom the requests for information were sent are partial evidences of the high plane of official responsibility maintained in these cities. This was notably true in the case of the towns and cities of Massachusetts.

A preliminary survey of the total number of reports disclosed the superficial and unsatisfactory character, at least for the intended purpose, of the financial data contained in most of them. They varied in excellence from the complete detailed statements of the work and financial operations of each city department, as for example those of Cambridge, Springfield, Newton, Boston, Manchester, and Rochester, to a bare enumeration of the municipal expenditures, listing the warrants in the order in which they were paid by the city treasurer, together with the amount and name of the payee. The only common term of the

reports seemed to be the effort to display official honesty in the handling of public moneys.

Some two hundred hours were spent in a thorough examination of twenty of the best and most complete of the reports. However, the variation in the completeness, and in the systems of classification, accounting, and reporting of municipal receipts and expenditures, presented very many obstacles to a satisfactory comparative study on the basis of the financial data contained in even these reports.

Recourse was now had to the financial information concerning cities published in the bulletins of the United States Department of Labor.[1] This statistical data had been gathered in compliance with an act passed during the second session of the Fifty-fifth Congress, by which, "the Commissioner of Labor is authorized to compile and publish annually, as a part of the Bulletin of the Department of Labor, an abstract of the main features of the official statistics of the cities of the United States having over 30,000 population."[2] In the introduction to the first report issued under the provisions of this act, September, 1899, the then Commissioner of Labor, Carroll D. Wright, has given an insight into the difficulties attendant upon the gathering of the statistics published:

> The act of Congress . . . apparently contemplated a compilation of the official statistics of the various cities of 30,000 population and over from data to be furnished to the Commissioner of Labor by the cities themselves, such as, for instance, were included in their official annual reports, etc. Steps were taken, therefore, to obtain such reports from the officials of the various cities, and many reports were promptly received. In a number of instances, however, no reports were received, even though repeated efforts were made to secure them. In some cases the Department was informed that no printed reports were available, while in other cases no reply whatever was received in answer to its requests. An examination of the reports received showed that very few facts were reported uniformly by all of the cities, and that even the important financial statements were presented in so many different forms as to preclude such classification of the various items as seemed necessary for a satisfactory comparison.

[1] No. 24, September, 1899; No. 30, September, 1900; No. 36, September, 1901; No. 42, September, 1902.

[2] Bulletin No. 24, United States Department of Labor, September, 1899, p. 625.

It was believed that in order to be valuable for comparison and for other purposes the various items relating to the governmental, financial, and other conditions of these cities should be reported uniformly and accurately. Even had the Department been furnished with the reports for all of the cities within the limits of the investigation, the many difficulties encountered in a tentative effort with the reports already received led to the conclusion that uniformity and accuracy could be secured only by sending the special agents of the Department to the cities for the data desired. A schedule of inquiries was accordingly prepared and the work taken up by the agents of the Department at once. The utmost interest in the investigation was manifested in nearly every city by the officials who were visited, and they gave freely their time in compiling the data desired and in every way assisted the Department in the work. In many cases the methods of bookkeeping in vogue made a uniform classification of financial items, as called for by the schedules of the Department, very difficult and required much time and labor.

Under the provisions of the above mentioned act, four annual bulletins of the statistics of cities were issued by the Department of Labor, the last one being distributed in September, 1902, and containing the data for the year 1901. Upon the creation of the Department of Commerce and Labor as a cabinet department in 1903, the work of gathering and publishing these municipal statistics was transferred to the permanent Bureau of the Census.

The data presented in Bulletins 36 and 42 of the Department of Labor, issued in September of 1901 and 1902, respectively, have been made the basis of the first portion of this study.[1] The last two of the series of four bulletins were selected because of their evident superiority in completeness and accuracy over the first two.

The reasons for selecting these data are as follows. First, aside from the incomplete and otherwise unsatisfactory statistics of a similar nature presented in the publications of the Tenth and Eleventh Censuses, they comprised the only source of either moderately complete or fairly reliable material such as it was

[1] This study was begun and completed before the data of the financial operations of cities for 1902 and 1903, published in *Bulletin 20*, Bureau of the Census (September, 1905), became available. The recent and more complete data gathered by the Bureau of the Census has been made the basis of the second portion of the study. See Sections X. and XI.

necessary to employ in the present instance. The almost overwhelming obstacles and prohibitive expense preclude the gathering of data of this variety and scope through individual effort. Second, because they pertained to *all* of the cities of the indicated population class, an element altogether too frequently disregarded, especially in comparative educational statistics.

There is also a secondary reason for subjecting such data as these to a critical examination; for by such examination their value or uselessness for scientific purposes may be demonstrated. Municipal statistics, even when gathered through the agency of the Federal Government and with undoubted motive of making a valuable contribution to municipal and economic sciences, should be subjected to some process of interpretation beyond that of mere gross and doubtful comparisons, if the final and more valuable purpose is to be attained.[1]

Method of Statistical Treatment.—Apart from the details of treatment recorded in the following pages, it is desired to emphasize here the two fundamental principles underlying the method pursued.

The first is the principle of *inclusion*. That is, with the data for 1900 and 1901, all cities possessing 30,000 or more population have been included.[2] The immediate aim has been to present some of the fiscal aspects and relationships of education in the American city, regarded as a *type*.

The second is the principle of *relativity*. In more than one way has public education become isolated as a social institution; and this has been the more so with such of the features as are usually presented by financial statistics. The statistics of public school enrolment or attendance of any particular city, for

[1] "No attempt has been made to interpret and compare the statistics here presented. In this respect the Bureau again follows the precedent of the Department of Labor. But it is believed that after the inquiry has been carried on for a longer period and the methods of collecting the statistics further perfected, the time will be ripe for a study of the data, which may lead to reliable and interesting comparisons and deductions." —(*Bulletin 20*, Bureau of the Census, 1905, p. 4.)

[2] This is not *wholly* true, inasmuch as three of the 135 cities were necessarily excluded from consideration, owing to partial or total absence of essential data. An adequate note of these exceptions appears in the proper place, see pp. 20 and 24 (Foot note (*b*)). No attempt has been made to select cities for study on the grounds of any presupposed or real, positive or negative, excellence, either educational or otherwise.

instance, are not valuable in themselves as social statistics, unless there is known also the number of adults in the community and the number of pupils who do not attend school or who attend schools other than public schools. A statement of the salary standards of public school teachers in the different cities of the country has no particular meaning, unless accompanied by some notion of the standards maintained in other professional work and of the standards of living in the various communities. Thus, too, with the data of educational expenditures as a whole. Our entire list of concepts regarding these factors has been formulated by viewing educational activity almost entirely apart from the other essential activities of modern municipal life. In view of the present development and increasing demands of public education in American cities, there is need for some scientific study of its cost in relation to that of other municipal functions. The use of the Pearson Coefficient of Correlation for stating these relationships as they have been found to exist may, by some, be thought to savor somewhat of over-refinement. In reply to this anticipated objection it may be said that it is owing to the lack of the application of the more refined statistical methods to the data of educational organization and practices that has rendered both useless and misleading much of the so-called statistical material. The use of such a factor as the Pearson Coefficient has been found to be of indispensable service in the realm of the biological and social sciences. Its definite application to the fiscal problem of education [1] may mark a step in advance and provide us with an efficient instrument for testing the validity or falsity of our present notions and standards.

IV. Character, Arrangement, and Preliminary Manipulation of Data

Data of Expenditures for Municipal Maintenance and Operation for 1900 and 1901.—Tables XX. and XXII. of Bulletins 36 and 42, respectively, of the United States Department of Labor contain the expenditures for maintenance and operation of the

[1] The adequacy of the Pearson Coefficient in this respect has been admirably demonstrated by Dr. George D. Strayer in his recent study, "City School Expenditures," *Teachers College Record*, Vol. VI., pp. 107–209.

governmental activities of the 135 [1] American cities possessing a population of 30,000 or over according to the Census of 1900. These expenditures are classified under the following headings: (1) police department; (2) police courts, jails, workhouses, reformatories, etc.; (3) fire department; (4) health department; (5) hospitals, asylums, almshouses, and other charities; (6) schools; (7) libraries, art galleries, museums, etc.; (8) parks and gardens; (9) sewers; (10) municipal lighting; (11) street cleaning; (12) street sprinkling [2]; (13) other street expenditures; (14) garbage removal; (15) interest on debt; (16) waterworks; (17) gas-works; (18) electric-light plants; (19) docks and wharves; (20) ferries and bridges; (21) markets; (22) cemeteries, (23) bath houses and bathing pools and beaches; (24) other items. Accompanying the tables are numerous notes in reference to peculiar characteristics or arrangements of the data for particular cities.

Naturally, in view of the difference in size, location, and standards of municipal life of the various cities, the expenditure for each of the above items is not to be found for every city. It was not possible, for example, in many cities to separate the expenditures for the police department from those for police courts, jails, etc.; in some, jails and police courts are maintained at county or state expense. Many include expense for garbage removal under health department, or possibly under streets; many keep no separate accounts for street cleaning, street sprinkling, sewers, etc., all of these items being included in a general item of street expenditures. However, a close examination of the tables revealed a sufficient degree of completeness in the items with which it was desired to work.

For statistical purposes, and even for a clear insight into the financial operations of cities, the system of classification employed in the arrangement of these data is open to serious objection. This whole subject of accounting and classification of public revenues and expenditures, at least as far as such investigations as this are concerned, is taken up at length and in greater detail in a later section.[3]

[1] Bulletin 42 contains 137 cities. The 135 cities common to both bulletins were selected in order to give data for two years for all cities considered.

[2] In Bulletin 36 items 11 and 12 are included as one item.

[3] Section VII, p. 46 ff.

Showing percentages of total amount expended for maintenance and operation

All cities in the United States

	City.	Police department.	Police courts, jails, etc.	Fire department.	Health department.	Hospitals, asylums, almshouses, etc.	Schools.	Libraries, art galleries, museums, etc.	Parks and gardens.	Sewers.	Municipal lighting.
1	New York, N. Y....	10.15	.791	4.66	.924	4.66	14.9	.555	1.72	.648	2.45
2	Chicago, Ill.....	19.30	1.460	8.30	.878	.04	31.8	.894	3.30	2.00	2.19
3	Philadelphia, Pa....	14.30	2.640	5.02	1.480	2.49	17.1	1.33	2.63	.432	5.75
4	St. Louis, Mo.....	17.80	1.270	8.01	1.420	6.14	16.8	.453	1.29	1.12	5.72
5	Boston, Mass.....	8.66	6.660	6.26	.824	6.16	15.4	1.61	2.50	1.88	3.77
6	Baltimore, Md.....	11.20	2.770	5.84	.995	4.07	15.4	.034	3.29	.418	5.22
7	Cleveland, Ohio.....	8.64	1.910	9.83	1.540	2.73	23.7	1.65	.786	.694	5.15
8	Buffalo, N. Y.....	13.10	.406	11.00	.725	2.60	19.1	1.65	3.21	.197	5.79
9	San Francisco, Cal..	14.80	1.980	9.88	1.660	3.82	20.9	.754	2.66	.824	3.94
10	Cincinnati, Ohio....	9.88	1.840	8.13	.677	3.45	17.3	1.13	.611	.696	5.56
11	Pittsburg, Pa.....	8.07		7.85	1.310	2.25	13.5	1.03	2.88	1.11	4.75
12	New Orleans, La....	5.60	1.330	6.24	1.190	1.18	10.4	.173	.205		5.14
13	Detroit, Mich.....	16.00	.341	14.60	1.030	2.09	23.9	1.79	2.89	1.41	
14	Milwaukee, Wis.....	9.32	.507	11.40	.979	.36	21.1	1.60	1.86	1.40	6.25
15	Washington, D. C...	13.00	6.790	4.60	1.350	7.50	21.7	.140	1.16	1.39	4.62
16	Newark, N. J.....	8.55		5.88	1.190	4.25	18.3	.713	.0937	1.27	4.37
17	Jersey City, N. J....	9.94	.234	5.28	.176	.73	11.0	.763	.142	.448	3.99
18	Louisville, Ky.....	9.77	3.770	8.96	.301	2.23	17.9		1.70	.497	4.87
19	Minneapolis, Minn..	7.36	.537	11.20	.842	3.03	25.6	1.43	2.51	1.26	5.12
20	Providence, R. I....	9.56	.120	9.41	.451	1.06	17.9	.331	1.19	1.74	8.04
21	Indianapolis, Ind.. .	9.02	.160	10.10	.722	2.42	33.2	2.82	4.48	4.77	6.73
22	Kansas City, Mo....	11.90	1.160	11.90	1.960	.16	26.5	.963	2.39	.424	4.06
23	St. Paul, Minn.....	7.70	1.640	8.25	.377	1.00	19.0	.615	2.40	.714	8.06
24	Rochester, N. Y.....	5.54	.435	6.68	1.240	3.15	16.1	.077	.787	.0997	7.87
25	Denver, Col.....	7.56	.724	8.35	1.520	1.87	37.2	1.27	3.64	.831	5.88
26	Toledo, Ohio.....	6.96	1.870	7.57	1.040	(a)	25.9	.732	1.17	.872	5.14
27	Allegheny, Pa.....	6.85		6.67	.763	3.55	17.3	1.15	1.37	.754	
28	Columbus, Ohio.....	7.05	1.010	9.56	1.290	.66	22.5	.522	.535	.658	3.53
29	Worcester, Mass.....	5.65		6.36	1.110	5.56	21.2	1.58	1.04	11.5	4.61
30	Syracuse, N. Y.....	7.57	.735	9.22	.817	5.86	21.8	1.93	1.91		5.90
31	New Haven, Conn...	13.50	.967	9.78	.538	5.25	26.6	1.13	1.41	.798	5.46
32	Paterson, N. J.....	9.99	.299	10.10	.584	5.22	25.2	1.56	2.44	.954	6.41
33	Fall River, Mass....	8.54		7.57	.933	8.22	18.1	1.01	.186		6.01
34	St. Joseph, Mo.....	12.60	1.250	12.90	1.680	.41	28.4	1.22	1.14	.825	
35	Omaha, Neb.....	5.42	.739	8.11	.539	.30	25.6	1.29	1.29	1.93	5.32
36	Los Angeles, Cal....	9.57	.719	9.14	.914	.29	32.7	1.39	4.08	.306	3.27
37	Memphis, Tenn.....	11.20		9.41	7.460	3.55	15.9	.698	.229		5.17
38	Scranton, Pa.....	8.05	.519	7.39	.709		48.6	1.42	.641	1.03	6.37
39	Lowell, Mass.....	10.20		8.69	2.34	9.27	24.7	1.05	.959	1.16	6.56
40	Albany, N. Y.....	11.40	.461	9.92	.929	4.81	22.5	.416	2.56	.124	5.12
41	Cambridge, Mass....	5.71		4.17	.922	4.89	21.4	.700	.928	4.30	3.25
42	Portland, Ore.....	4.94	.305	7.40	.320	.37	22.9		.807	.366	4.32
43	Atlanta, Ga	13.70		10.60	10.60	4.83	14.5	.481	1.38	.586	7.09
44	Grand Rapids, Mich.	7.94	.968	11.40	1.260	2.12	28.1	.694	2.16	.739	
45	Dayton, Ohio.....	7.84	1.630	8.65	.584	1.39	32.7	1.02	.245	.258	5.19
46	Richmond, Va.....	8.38	.337	7.45	.743	3.24	10.6	.411	3.02	.152	2.58
47	Nashville, Tenn.....	10.60	.501	10.20	2.220	2.55	20.7	.310		.124	5.63
48	Seattle, Wash.....	5.84	.733	7.94	.934	.38	18.9	1.06	.501	.305	1.94
49	Hartford, Conn.....	9.24	.652	9.06	.915	6.64	24.2	.827	1 83	.591	4.31
50	Reading, Pa.....	9.38		6 51	.505		28.2	.528	1.77	4.67	9.08
51	Wilmington, Del....	12.40	.614	5.71	1.200	.13	25.9	1.04	2.02	.526	7.06
52	Camden, N. J.....	13.40	.611	10.20	.476	1.35	24.7	.132	.159	.136	9.58
53	Trenton, N. J.....	11.20	.470	9.81	.716	2.29	21.1	.573	1.57	.942	2.65
54	Bridgeport, Conn.. .	8.27	1.070	9.98	.921	8.07	23.4	1.73	2.68	.863	7.51
55	Lynn, Mass.....	6.14		7.18	.857	7.79	18.4	1.77	.511	.888	3.94
56	Oakland, Cal.....	12.80	1.200	11.40	1.430	.30	37.6	1.82	1.33	.673	8.62
57	Lawrence, Mass.....	7.33		6.68	4.950	7.83	21.2	1.48	.716	.953	4.07
58	New Bedford, Mass.	11.00		7.22	.769	5.66	20.2	1.42	1.89	.788	4.93
59	Des Moines, Iowa...	5.96	.791	9.71	1.900	.34	40.7	1.14	2.10	1.99	6.85
60	Springfield, Mass....	5.12		7.96	.498	4.39	26.7	2.40	1.98	.409	4.89
61	Somerville, Mass....	5.33		5.39	.933	3.13	25.0	1.22	.934	.839	4.76
62	Troy, N. J.....	11.60	.469	6.60	1.340	10.60	18.7		.269	.466	7.67
63	Hoboken, N. J.....	14.10	.444	9.96	.705	2.36	24.0	1.05	.588	.743	3.30
64	Evansville, Ind.....	9.15	.427	10.20	.499	.17	31.9		.196	.404	5.77
65	Manchester, N. H...	6.53	.452	13.00	1.290	3.33	18.7	.839	.866	.59	8.96
66	Utica, N. Y.....	6.28	.363	10.70	1.200	2.57	24.3	1.04	.437	.706	9.53
67	Peoria, Ill.....	9.56	2.440	9.81	1.140		31.4	1.82	1.95	.942	7.21
68	Charleston, S. C.....	12.70		8.30	2.000	11.50	12.3	.081	1.05	1.53	4.90

(a) Less than .01.

[1] Percentages obtained from data published in Bulletin 36 of

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devoted to each of the municipal departments for the fiscal year 1900 [1]

above 30,000 population

Street cleaning and sprinkling.	Other street expenditures.	Garbage removal.	Interest on debt.	Waterworks.	Gas-works.	Electric-light plants.	Docks and wharves.	Ferries and bridges.	Markets.	Cemeteries.	Baths.	Other items.	
4.10	1.84	1.04	13.12	3.22			.656	.360	.067		.048	33.69	1
3.02	1.50	2.25	6.73	6.36		1.54	.101	1.030	.017		.054	7.27	2
1.63	3.59	2.96	10.90	7.79			.024	5.210	.023		.495	19.40	3
3.32	3.57	2.15	8.66	6.70			.660	.379	.073			14.50	4
2.67	7.32	3.16	11.10	6.47				2.040	.142	.332	.572	12.40	5
2.67	2.19	2.22	20.10	3.62			.056	.286	.069		.054	19.50	6
1.20	1.99	1.50	14.40	5.89				2.250	.450	.648		15.10	7
2.98	4.02	1.86	10.90	5.86			.756	.179	.230	.001	.01	15.40	8
2.70	3.13		.25					.096				32.50	9
3.29	1.68	.42	28.90	7.85			.080	.445	.221			7.83	10
2.47	4.25	1.40	12.40	4.65			.382	.757	.288			30.80	11
2.94	.26	2.49	14.70									48.20	12
4.69	11.50	1.79	8.64	3.60		3.34		.589	.070			1.71	13
5.16	3.80	4.80	9.22	4.46			.078	1.720			.325	15.80	14
3.48	6.42	1.14	8.43	3.32				.651	.134		.020	14.10	15
2.54		1.38	8.37	6.96					.415		.121	35.70	16
1.47	2.99		23.20	8.96			.073					30.70	17
3.60	5.59		17.60	4.91			.279					17.90	18
5.90	2.03		12.90	3.74				.365				16.30	19
1.73	5.57	.698	20.50	2.64				.636		.626		17.90	20
5.36	1.54	2.53	7.72	.18				.301	.632			11.80	21
4.41	1.15	.94	12.00	8.48				.238	.088			11.50	22
4.34	3.36	.88	22.50	3.47				2.730				12.80	23
3.10	1.89	2.69	21.80	2.58				.595		1.120		24.20	24
4.18	.952	.52	7.60					.017	.382			17.40	25
2.53	4.79	.81	21.10	4.81	1.24			1.380	.513	.626		11.30	26
2.73	5.53	1.59	14.00	12.50		4.21	.170		.321			20.70	27
3.96	.82	.81	21.10	6.91		.020			.451			18.50	28
2.90	8.72	.70	14.90	2.56							.020	11.50	29
5.01	3.66	4.05	15.20	5.52				1.610	.275	.077	.283	8.63	30
6.45	3.89	.39	10.50					.772				12.40	31
4.60	5.09	2.78	12.30									12.50	32
2.54	7.17	2.01	8.29	9.66						1.380		18.30	33
2.46	4.81		15.80			5.58		.206				10.70	34
1.62	2.52		20.20						.148			24.90	35
6.49	5.91	.82	4.89									19.40	36
3.06	10.33		18.60				.756	2.350	.668			10.60	37
1.85	2.06	.43	8.06					.694				12.30	38
2.35	2.21	1.41	13.70	6.38						.709		8.09	39
2.49	2.27	.03	16.60	9.23				.377	.118			10.70	40
2.79	7.06	2.49	14.70	3.37				2.360		.826	.061	19.90	41
3.18	1.00	.36	27.00	3.66								23.00	42
	4.20		14.50	5.87				.145		.837		11.00	43
3.69	.68	.44	7.50	8.93		2.22		.154	.373	1.950		18.70	44
2.31	2.61	2.05	19.80	4.46				1.580	.669			7.02	45
2.81	3.36	1.62	30.90	3.14	11.90			.292	.497	.717		7.60	46
1.62	6.81	3.74	20.60	6.82					.343			7.17	47
.854	2.05	.06	20.30	7.14			.181	.035				30.60	48
4.72	13.6	1.87	13.10	4.59				.835		.422	.181	2.61	49
2.26	3.84	2.83	8.37	8.32					.157			13.50	50
2.35	3.34	4.18	13.50	9.27							.038	10.70	51
1.57	3.77	1.09	16.70	9.49								6.54	52
2.43	2.11	1.46	20.10	7.46								15.10	53
3.48	6.19	3.28	9.12					.575				13.00	54
1.55	6.21	2.61	15.40	4.68						2.190		19.60	55
6.94	2.64		3.39				.429					9.43	56
2.38	5.48	1.37	13.00	7.22				.371		1.300		13.60	57
1.10	5.51	2.24	16.90	4.45			.624	.168		2.89	.071	11.90	58
2.24	1.46		4.59					1.950		1.24	.151	16.90	59
3.43	3.32	1.80	11.10	3.94								22.20	60
1.62	6.09	1.89	6.29	5.73				.039				31.2[illegible]	61
9.86	.63	4.55	7.92	8.65			.013	.041	.040	.096		10.[illegible]	62
1.61	.25	.48	8.49	21.10						.475	.203	10.[illegible]	63
1.64	1.32	.62	18.60	7.14			.111	.077	.311			11.[illegible]	64
2.15	12.20	2.68	13.10	3.88						1.980		5.50	65
4.00	1.72	1.73	3.15					.328			.065	29.10	66
2.62	3.53	.12	8.89				.021	1.440				17.20	67
	5.15	3.84	25.4						.056			10.80	68

[1] the Department of Labor, September, 1901.

Showing percentages of total amount expended for maintenance and operation

All cities in the United States

	City.	Police department.	Police courts, jails, etc.	Fire department.	Health department.	Hospitals, asylums, almshouses, etc.	Schools.	Libraries, art galleries, museums, etc.	Parks and gardens.	Sewers.	Municipal lighting.
69	Savannah, Ga. (*b*)..										
70	Salt Lake City, Utah	4.81	.609	5.18	.722	.86	30.5	.864	.904	.165	3.77
71	San Antonio, Tex...	8.82		7.45	1.220	2.11	22.1		2.18	.005	1.15
72	Duluth, Minn.....	3.38	1.470	9.43	.596	1.16	21.2	.677	1.51	.67	2.40
73	Erie, Pa.....	7.09	.661	11.80	1.290	.01	32.2	2.00	.824		8.28
74	Elizabeth, N. J.....	8.63	.131	3.97	.655	3.16	20.7			.648	4.31
75	Wilkesbarre, Pa.....	9.49	1.230	10.30	.871		39.7		1.41	2.21	10.50
76	Kansas City, Kas....	7.93	.741	6.71	5.820		27.7	.347	4.48	1.93	6.25
77	Harrisburg, Pa.....	7.37		5.35	.809	.06	33.8		.232	.116	7.87
78	Portland, Me.....	5.51		6.81	.269	4.81	17.2	.623	.881	1.01	3.99
79	Yonkers, N. Y.....	9.41	1.040	3.04	1.890	.52	23.5	.441	2.22	.502	7.11
80	Norfolk, Va.....	7.42	.124	6.07	2.590	1.98	6.8	.197	1.34	1.91	2.76
81	Waterbury, Conn.. .	8.79	1.130	7.66	.714		39.5	.236	.236	1.18	5.18
82	Holyoke, Mass.....	6.34	.512	9.17	.599	6.24	27.2	.428	.963	.351	4.02
83	Fort Wayne, Ind....	8.24		13.90	.909		28.7	1.40	2.81	.661	7.32
84	Youngstown, Ohio..	11.40	.996	8.85	1.840	2.32	35.7	.392	1.19	.584	6.65
85	Houston, Tex.....	8.91		10.00	3.390		17.9		.443	.414	2.05
86	Covington, Ky.....	7.54	.149	7.67	1.890	4.07	19.8			.776	3.10
87	Akron, Ohio.....	7.49	.831	13.20	.789	4.04	30.4	.678	.835	.349	7.99
88	Dallas, Tex.....	7.99	1.100	7.67		3.63	17.6		.602	.035	4.95
89	Saginaw, Mich.....	6.84	.757	6.77	.072	3.86	35.1	.236	.136	.296	5.91
90	Lancaster, Pa.....	7.42		6.85	.682		33.0			.361	11.20
91	Lincoln, Neb.....	3.74	.614	7.75	.977	.03	34.9	1.03	.023	1.14	4.82
92	Brockton, Mass.....	5.96		8.22	1.010	6.85	20.3	1.69		1.42	4.03
93	Binghamton, N. Y...	7.83	.480	6.32	1.820	2.40	37.1	.368	.933		11.20
94	Augusta, Ga.....	12.40	.899	12.30	1.680	6.14	17.6			1.01	5.45
95	Pawtucket, R. I.....	6.79	.006	5.40		2.62	17.7	.993	.111	1.46	4.51
96	Altoona, Pa.....	6.68	.336	7.79	.790		34.1			.207	6.31
97	Wheeling, W. Va....	6.88	1.200	8.56	1.240		25.1	1.19		.626	
98	Mobile, Ala.(*b*)										
99	Birmingham, Ala....	12.20	3.870	9.45	2.370	1.20	13.7		.440	.058	5.09
100	Little Rock, Ark....	13.10		13.90	2.610	3.06	34.1			.784	
101	Springfield, Ohio....	6.25	1.230	6.38	.495	5.71	28.5	1.15	2.56	.952	8.65
102	Galveston, Tex.(*b*)..										
103	Tacoma, Wash.....	2.79	.245	4.34	.260		10.9	.356	.629	.797	
104	Haverhill, Mass.....	5.41		8.52	.580	6.55	21.3	2.31	1.24	1.13	6.00
105	Spokane, Wash.....	6.55	.716	11.50	1.310	1.32	20.9	.380	.484	.219	1.72
106	Terra Haute, Ind...	8.33	1.250	10.80	.975	2.13	35.8	1.75	.545	.402	6.39
107	Dubuque, Iowa.....	7.94		8.65	.448		28.8		.362	1.33	6.79
108	Quincy, Ill.....	7.87	3.290	10.40	1.380		26.9	1.75	1.47	.461	7.36
109	South Bend, Ind....	7.67		10.60	.308		32.3	1.08	1.75	.866	6.48
110	Salem, Mass.....	6.22		5.43	2.950	7.57	20.0	1.19	.979	.696	6.50
111	Johnstown, Pa.....	8.54	.288	4.90	.481		45.6			.979	8.43
112	Elmira, N. Y.....	8.86		14.90	1.620	3.14	22.6	.328	1.25	.778	9.49
113	Allentown, Pa.....	4.49		9.37	.747		36.9				8.08
114	Davenport, Iowa....	7.48		7.36	2.030		39.6		1.78	.361	6.76
115	McKeesport, Pa.....	8.59		10.10	1.380		30.8			.355	5.72
116	Springfield, Ill.....	9.28	.929	12.20	.555		29.5	.868	.929	.577	6.56
117	Chelsea, Mass.....	7.33		7.03	2.210	10.60	25.5	1.02	.275	.472	5.92
118	Chester, Pa.....	9.55		5.19	.905		34.6		1.77	3.89	8.86
119	York, Pa.....	9.84		7.61	.412	.17	36.3		.187		11.90
120	Malden, Mass.....	5.23		5.39	2.580	6.35	21.9	1.53	1.23	1.42	4.63
121	Topeka, Kansas....	6.62	.615	8.27	2.570		35.8	1.30	1.89	.345	.04
122	Newton, Mass.....	5.71		5.38	1.810	3.01	16.1	1.37	.438	4.57	4.45
123	Sioux City, Iowa....	5.21	.451	6.38	1.030		27.2	.571	.33	1.53	4.36
124	Bayonne, N. J.....	7.56	.078	2.00	.626	.52	22.8	.822		.037	6.84
125	Knoxville, Tenn.....	9.15		9.77	.615	2.21	18.2				9.52
126	Schenectady, N. Y..	10.40	.735	6.36	1.820	2.37	24.5	.612	.169	1.48	7.12
127	Fitchburg, Mass.....	6.57		5.56	1.070	6.99	21.7	1.78	.584	1.18	6.05
128	Superior, Wis.....	4.37	.509	7.25	1.390	.66	23.1	.572		.594	1.94
129	Rockford, Ill.....	5.37	.572	8.64	.645	.40	34.9	1.84	.249	.476	7.68
130	Taunton, Mass.....	8.14	.187	5.48	.737	6.51	23.5	1.54	.249	.725	1.83
131	Canton, Ohio.....	6.46		8.28	.874	1.18	31.7	.345	.691	1.89	6.98
132	Butte, Mont.....	11.60	1.560	12.40	3.090		38.6	2.37		.275	4.37
133	Montgomery, Ala...	9.98		7.21	2.460	.55	7.41				4.90
134	Auburn, N. Y.....	5.09		5.99	.858	4.60	23.9	.581		.351	8.14
135	Chattanooga, Tenn..	10.60		11.20	4.390	2.15	15.0	.05	1.52	.536	10.3

(*b*) No data for school expenditures. [1] Percentages obtained from data published in Bulletin 36 of

No. 1 (*Continued*)

devoted to each of the municipal departments for the fiscal year 1900 [1]

above 30,000 population

Street cleaning and sprinkling.	Other street expenditures.	Garbage removal.	Interest on debt.	Waterworks.	Gas-works.	Electric-light plants.	Docks and wharves.	Ferries and bridges.	Markets.	Cemeteries.	Baths.	Other items.	
													69
5.78	1.48	1.19	21.60	6.25						1.12		14.10	70
4.05	8.38	2.37	21.10						.352			18.80	71
.78	2.48		27.90	2.93	2.56		.99		.015			19.50	72
1.14	3.34		8.69	11.60			.215	2.280				10.60	73
	4.02	1.12	22.70									30.00	74
	6.99		7.03							.532		11.20	75
2.46	2.31		24.10					1.490		.029		11.90	76
1.23	5.08		14.90	7.51				3.560				12.20	77
1.68	6.21	.47	14.20							2.57		33.90	78
3.45	3.26	3.21	19.20	5.74				.058			.329	15.10	79
4.20	2.43		30.30	6.05					.098	.922		24.90	80
2.01	2.24	1.65	12.60	4.56								12.20	81
2.43	2.13	2.69	14.80	4.94				.831			.058	16.20	82
2.51	2.87	1.88	10.00	8.15				.328				10.20	83
5.58	.33		9.87	5.29				.097				10.00	84
.58	11.50	2.89	25.70					.065	.997	.011		15.10	85
	6.33	.93	18.80	6.50					.073			21.10	86
	7.76		6.92					.590				18.00	87
2.65	4.95	.09	21.60	6.61								20.50	88
1.89	2.81	.06	15.10	7.65				1.460		.591		10.50	89
2.41	4.52	.72	11.20	10.60								10.90	90
2.26	2.39		23.80	7.03						1.39		8.03	91
2.55	18.7	1.74	13.90	2.47						.421		10.70	92
3.08	5.60	.09	6.15	7.79								9.01	93
.82	1.14	1.02	22.30	3.56				.277		1.58		11.90	94
1.61	4.60	.52	25.00	19.50						.701		8.56	95
1.85	4.34		14.40	7.66				.524	.324			14.60	96
1.41	2.21	1.77	6.24	10.40	19.0	4.95	.148	.105	.414	.218		8.41	97
													98
	5.51	2.76	24.26						.264	.591		18.40	99
	2.98		3.06			4.31						22.20	100
	12.50	.64	12.90	5.91				1.700	.297	.081		3.96	101
													102
	3.06		65.70	2.69		5.10	.116					3.24	103
4.41	6.29	1.45	13.50	3.72				.291		.066		17.10	104
2.05	5.14		24.80	2.39				.671				19.90	105
3.78	1.95	1.45	5.77							1.42		17.20	106
3.67	4.48	.63	19.40	4.23			.045		.212			13.20	107
1.44	4.31	.81	20.90						.048	.341		11.30	108
3.24	2.25		13.90	9.31				.072		.661		9.56	109
1.64	6.95	.47	8.90	5.47				.315	.083	1.03		23.50	110
3.94	2.92		10.80									13.10	111
.55	7.38	.06	9.11					1.22		1.58		17.00	112
.36	5.31	.86	11.90	14.2								7.67	113
4.73	2.55	.85	4.74				.074	1.58				16.80	114
2.84	2.92		7.51	9.56								20.20	115
3.18	2.38		15.20	5.59						2.47		9.73	116
2.72	6.08	1.94	14.60	3.84								10.40	117
.39	7.20	.79	14.10									12.90	118
	4.52	3.12	5.92						.085			19.90	119
1.86	10.9	1.63	8.12	5.31				.078		1.36		20.60	120
2.11	6.76		14.20			3.32		.412				15.70	121
3.10	9.95	.82	22.00	1.74						.019		19.90	122
1.45	5.01	1.53	22.00	5.36				2.410		.057		15.20	123
1.19	1.61	1.06	16.90	2.54								35.30	124
	10.8		28.40									11.40	125
6.42	6.01	.24	16.10	12.30				.475				2.92	126
2.43	7.55	.51	14.80	7.16						1.41		14.70	127
3.68	1.06		19.40				.078					35.40	128
2.84	9.15	.57	8.98	10.60				.114				7.07	129
1.76	6.95	.22	15.10	4.89		5.66				.523		16.10	130
	8.31		13.80	7.41					.169			11.91	131
8.15	2.05	.57	7.89									7.11	132
	4.77	1.82	26.20	14.10					.365	.717		19.50	133
1.66	3.53	1.12	6.61	6.44				.972		.168		30.00	134
1.41	2.94	1.74	17.90					.087				20.10	135

the Department of Labor, September, 1901.

Showing percentages of total amount expended for maintenance and operation

All cities in the United States

	City.	Police department.	Police courts, jails, etc.	Fire department.	Health department.	Hospitals, asylums, etc.	Schools.	Libraries, art galleries, museums, etc.	Parks and gardens.	Sewers.	Municipal lighting	Street cleaning.
1	New York, N. Y.....	9.90	1.27	4.60	1.13	4.61	19.17	.71	1.33	.41	2.65	2.82
2	Chicago, Ill.....	16.55	1.11	7.40	.85	.06	36.85	.94	3.41	1.27	2.13	2.22
3	Philadelphia, Pa.....	15.88	6.48	5.76	1.31	3.69	17.37	1.34	2.35	1.43	6.46	1.67
4	St. Louis, Mo.....	18.38	1.33	8.82	1.77	7.57	17.51	.42	1.32	1.12	6.72	1.50
5	Boston, Mass.....	8.01	5.16	5.87	.92	5.51	13.07	1.22	1.91	1.80	3.60	1.61
6	Baltimore, Md.....	12.71	1.61	6.69	1.24	4.07	18.61	.54	2.73	.53	4.30	2.73
7	Cleveland, Ohio.....	8.69	2.42	10.15	2.06	2.99	26.17	1.72	1.62	1.04	5.39	1.30
8	Buffalo, N. Y.....	13.52	.41	11.75	.81	2.31	19.81	1.68	3.41	.19	5.99	2.45
9	San Francisco, Cal...	13.39	2.75	11.17	1.14	4.38	19.80	.80	2.83	1.07	4.32	3.03
10	Cincinnati, Ohio.....	8.93	2.14	7.59	.69	3.83	18.12	1.38	.73	.52	5.48	3.75
11	Pittsburg, Pa.....	9.07		10.34	1.59	2.73	15.60	2.33	3.01	.82	5.66	4.69
12	New Orleans, La.....	5.38	.86	6.20	1.04	1.39	11.12	.23	.26	.88	5.03	2.44
13	Detroit, Mich.....	13.36	.28	13.72	1.03	1.39	21.44	1.26	2.68	.90		3.98
14	Milwaukee, Wis.....	9.17	.97	12.15	1.14	.26	20.49	1.77	1.42	2.58	5.63	2.95
15	Washington, D. C....	11.54	4.62	4.47	1.19	6.83	19.84	.15	1.37	2.30	4.13	2.96
16	Newark, N. J.....	11.24	1.07	8.37	1.97	3.28	21.79	1.06	.12	1.87	5.71	3.65
17	Jersey City, N. J.....	11.71		6.70	.23	.79	13.90	.87	.31	.58	4.48	1.87
18	Louisville, Ky.....	9.86	3.83	8.28	.29	2.36	18.48		1.67	.54	5.44	3.92
19	Minneapolis, Minn....	7.36	1.15	11.05	.84	3.06	25.03	1.43	2.33	.71	5.26	1.39
20	Providence, R. I.....	10.70	.15	10.30	.73	1.14	21.40	.64	1.36	2.09	8.40	1.73
21	Indianapolis, Ind.....	9.93	.15	10.70	.92	2.24	32.70	1.57	3.60	.63	6.62	3.27
22	Kansas City, Mo.....	9.30	.92	9.03	1.15	1.52	20.20	1.03	3.60	.82	2.87	3.30
23	St. Paul, Minn.....	7.55	1.48	8.18	.43	1.01	23.93	.64	2.33	.68	5.47	6.19
24	Rochester, N. Y.....	6.12	.48	7.43	.86	2.69	16.98	.13	1.05	.11	7.72	2.79
25	Denver, Col.....	8.49	.59	8.22	1.35	1.84	35.93	1.28	3.71	1.05	4.86	2.20
26	Toledo, Ohio.....	7.02	1.36	7.40	.89	.02	25.33	.69	2.85	.80	4.92	2.83
27	Allegheny, Pa.....	8.41		8.98	.95	4.57	22.13	1.93	1.72	.76		2.75
28	Columbus, Ohio.....	6.94	1.91	9.95	1.08	.89	23.55	.62	.65	.54	4.23	4.05
29	Worcester, Mass.....	6.33		7.09	1.32	5.82	21.90	1.01	.95	9.85	5.16	1.78
30	Syracuse, N. Y.....	6.00	.59	7.66	1.37	4.43	17.87	1.16	1.33		4.83	3.56
31	New Haven, Conn....	13.59	1.46	9.88	.54	5.41	26.34	.95	1.49	1.36	6.02	2.76
32	Paterson, N. J.....	10.01	.28	9.78	.67	4.45	25.48	1.14	1.62	.91	7.08	2.79
33	Fall River, Mass.....	8.64		7.62	1.58	9.09	20.20	.94	.11		6.19	1.44
34	St. Joseph, Mo.....	6.79	1.00	6.79	.19	1.88	17.73	.86	.99	.02	.04	.99
35	Omaha, Nebr.....	6.32	.75	8.18	.58	.65	27.16	1.16	1.42	1.48	5.55	1.59
36	Los Angeles, Cal.....	8.37	.51	8.48	.90	.98	33.75	1.29	4.20	.57	4.88	2.41
37	Memphis, Tenn.....	11.10		1.00	7.26	3.71	15.40	.56	.32	.34	5.40	1.11
38	Scranton, Pa.....	7.64	.49	7.50	1.12		41.40	1.30	.56	1.06	6.14	2.09
39	Lowell, Mass.....	9.69		8.46	.86	7.66	23.58	1.17	.80	.88	6.61	2.01
40	Albany, N. Y.....	10.77	.45	9.78	1.15	4.91	20.25	.66	3.10	1.02	6.20	.85
41	Cambridge, Mass.....	5.95		4.22	.85	6.65	20.38	.96	.99	4.42	3.39	1.39
42	Portland, Ore.....	5.59	.57	8.40	.59	.46	28.00		1.33	.52	5.18	4.09
43	Atlanta, Ga.....	12.15		10.11	8.48	5.13	14.32	.60	1.16	.69	6.48	
44	Grand Rapids, Mich..	8.19	1.32	11.84	1.60	1.48	29.43	.74	2.26	.68		4.23
45	Dayton, Ohio.....	9.36	1.46	7.93	.91	2.26	33.70	1.11	.29	.21	5.58	1.95
46	Richmond, Va.....	8.27	.33	7.34	.72	3.40	9.83	.05	.54	.79	2.71	2.72
47	Nashville, Tenn.....	10.85	.59	10.80	1.62	2.88	20.60	.61			5.75	
48	Seattle, Wash.....	7.64	.84	8.68	1.31	.76	23.56	1.67	1.77	1.05	2.96	1.51
49	Hartford, Conn.....	8.29	.42	7.97	.79	5.51	26.45	.75	2.28	.97	4.01	3.01
50	Reading, Pa.....	7.52		6.08	.70		30.70	.61	2.01	4.83	10.10	2.17
51	Wilmington, Del.....	12.20	.46	5.44	.76	.01	29.10	1.05	1.59	1.31	6.81	2.02
52	Camden, N. J.....	11.02	.72	10.30	.74	1.27	28.90	.23	1.84	.54	10.00	1.80
53	Trenton, N. J.....	11.00	.35	9.12	.84	2.26	27.80	.71	1.86	.57	6.95	1.90
54	Bridgeport, Conn.....	8.79	1.05	9.67	.61	8.72	23.00	1.59	2.45	1.08	7.13	3.58
55	Lynn, Mass.....	6.61		7.93	.97	9.02	19.52	1.16	.74	.77	4.39	.69
56	Oakland, Cal.....	8.94	1.05	10.50	1.96	.31	40.90	2.14	.72	.59	8.74	2.40
57	Lawrence, Mass.....	8.03		7.34	1.81	8.81	22.93	1.46	.88	2.13	4.49	1.08
58	New Bedford, Mass..	11.14		7.73	2.97	6.68	23.08	1.37	2.26	.75	5.14	1.46
59	Des Moines, Iowa.....	6.84	5.96	10.90	.49	.36	36.70	1.52	4.07	1.58	6.65	2.28
60	Springfield, Mass.....	5.81		8.37	.61	4.94	30.92	2.57	1.90	1.14	5.73	2.14
61	Somerville, Mass.....	6.38		6.26	.78	3.93	28.39	1.62	.92	.98	5.62	1.51
62	Troy, N. Y.....	11.02	.44	6.34	1.96	8.77	21.18		.23	.64	8.21	10.46
63	Hoboken, N. J.....	13.06	.41	9.99	.81	1.85	22.51	1.02	.54	.69	3.31	1.93
64	Evansville, Ind.....	8.61	.28	10.08	.37	.38	29.26		.28	.67	4.68	2.58
65	Manchester, N. H....	7.23	.44	14.06	2.05	3.28	19.90	.84	.83	.66	9.42	1.37
66	Utica, N. Y.....	6.38	.37	11.65	2.03	2.63	26.04	.94	1.07	.59	9.66	3.56
67	Peoria, Ill.....	9.12	2.15	8.98	.86	3.28	28.68	1.58	4.10	.75	5.02	2.42
68	Charleston, S. C.....	14.78		7.94	1.96	10.66	12.76	.08	1.54	1.19	4.49	2.46

[1] Percentages obtained from data published in Bulletin 42 of the Department of

No. 2

devoted to each of the municipal departments for the fiscal year 1901 [1]

above 30,000 population

Street sprinkling.	Other street expenditures.	Garbage removal.	Interest on debt.	Waterworks.	Gas-works.	Electric-light plants.	Docks and wharves.	Ferries and bridges.	Markets.	Cemeteries.	Baths.	Other items.	
.10	4.27	2.55	13.30	2.91			.84	.86	.07	.001	.09	26.47	1
	1.33	2.39	6.80	6.80		1.49	.10	.50	.02		.07	7.03	2
	2.35	3.59	7.48	7.40			.07	.53	.04	.01	.05	14.60	3
1.73	3.37	2.49	8.93	7.50			.66		.07			8.70	4
.75	7.49	2.84	15.49	2.79				2.02	.001	.32	.71	18.10	5
.01	2.46	2.17	20.32	5.18			.07	.27	.39		.10	13.20	6
	.99	2.15	14.83	5.71			.86		.44	.61		10.00	7
	2.02	1.99	11.29	7.44			.88	.13	.24	.002	.05	13.60	8
.24	1.87		.25					.11				32.80	9
	1.92	.43	27.94	7.72			.07	.57	.21			7.90	10
	3.12	1.73	17.54	4.29			.08	.43	.22			16.70	11
	.37	2.23	18.60					.001	.09			43.80	12
	8.59	1.60	8.19	1.40		2.66	.006	.19	.18			17.10	13
2.12	4.11	4.89	8.46	4.07			.47	1.63		.30		15.50	14
.05	6.22	2.04	9.63	5.42				.23	.12		.04	16.83	15
		1.83	21.02	6.04			.002	.10	.55		.12	10.20	16
	4.31		27.61	15.42			.12					11.10	17
	5.35		17.41	5.30			.31			.02		16.90	18
3.81	2.20	.04	12.78	4.54				.85			.16	16.00	19
	6.70	.83	18.50	3.93				.87		.71	.63	9.93	20
2.44	1.60	2.45	7.53	.17				.33		.55		13.20	21
.36	2.24	.70	11.80	6.81				.23		.11	.001	24.10	22
1.13		.84	16.54	4.04				1.75	.09			17.69	23
1.23	1.79	3.29	16.14	3.16				.71		1.06	.08	26.10	24
2.33	3.49	.20	7.09						.15			17.20	25
	4.65	.76	20.71	4.28	.16			1.56	.39	.62		12.70	26
	2.30	1.70	15.65	12.73		6.03	.21		.34			9.50	27
	6.20	.88	19.13	6.93				.03		.51		11.65	28
1.54	9.88	.76	18.21	2.15				.05		1.05	.02	4.60	29
1.00	3.32	2.87	12.88	4.70				.95	.31	.05	.23	24.90	30
1.92	5.57	.41	11.09				.005	.98				10.10	31
.32	3.33	2.44	12.40									17.20	32
.60	7.74	1.99	14.34	3.22						1.25		15.00	33
	6.68	.34	8.02			2.06		.05	.11			44.50	34
	3.08	.20	17.97									23.90	35
3.79	6.91	.83	4.70						.12			17.30	36
2.28	10.70		17.60				.79	1.64	.85			9.99	37
	6.66		7.43					.63				16.10	38
.72	3.86	2.38	12.44	6.70				.69		.57		10.88	39
	4.56	.02	15.00	8.50				.32	.18		.13	12.05	40
1.23	7.41	2.61	15.08	3.72				.99		.84	1.01	18.90	41
	1.10	.47	31.70	3.62				.88				7.54	42
	8.05		12.31	9.63				.10		1.06		9.65	43
	1.20	.60	8.79	5.74		2.27		.50	.19	1.59		17.28	44
.07	2.02	2.29	18.30	4.34			.04	1.21	.54			6.37	45
.12	4.39	1.60	29.78	2.69	10.82			.34	.53	.71		12.24	46
1.47	6.27	4.32	19.60	7.25					.29			7.07	47
	2.76	.09	24.60	5.79			.23	.004				14.71	48
1.57	8.40	1.70	12.88	5.23				.93		.31	.14	8.32	49
	6.11	2.49	8.89	6.43					.17			11.30	50
	5.57	4.21	12.00	8.35							.05	8.95	51
	3.46	1.21	14.98	7.10								7.37	52
	1.91	2.31	18.20	6.10								8.18	53
.96	6.99	3.39	9.18					.75				11.20	54
1.77	6.53	2.96	16.74	6.30						2.37		11.46	55
2.05	3.13		3.26				1.10					12.20	56
1.43	3.73	3.70	12.11	11.07				.90		1.32		6.75	57
	5.51	2.35	15.27	3.54			.57	.01		3.18	.08	6.84	58
	1.41	.13	6.88					2.19		1.09	.11	16.20	59
2.33	7.02	1.99	12.05	3.76				.17			.05	8.34	60
	8.06	3.08	4.71	4.99								22.72	61
.75	1.10	2.92	8.13	7.60				.02	.11	.07	.01	9.98	62
	.20	1.06	7.84	19.35						.61	.18	14.59	63
1.18	.89	.83	17.38	9.59			.25	.16	.19	2.06		10.21	64
.57	7.35	2.76	13.00	4.93				.77		1.98		8.56	65
	1.11	3.52	5.09					1.73			.17	23.44	66
	2.71	.09	7.39					1.11				21.71	67
.25	2.74	3.90	25.66						.51			9.08	68

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Showing percentages of total amount expended for maintenance and operation
All cities in the United States

	City.	Police department.	Police courts, jails, etc.	Fire department.	Health department.	Hospitals, asylums, etc.	Schools.	Libraries, art galleries, museums, etc.	Parks and gardens.	Sewers.	Municipal lighting.	Street cleaning.
69	Savannah, Ga.	14.17	.01	12.45	2.91	2.90	(b)		1.41	.79	5.99	2.47
70	Salt Lake City, Utah.	5.11	.71	5.45	.67	1.26	33.49	.72	.99	.44	3.95	1.86
71	San Antonio, Tex.	8.78		8.19	2.78	1.34	20.12		2.37	.63		3.27
72	Duluth, Minn.	4.11	1.38	8.72	.60	1.32	24.02	.85	.86	.86	2.34	.38
73	Erie, Pa.	6.96	.40	11.91	1.51		31.12	1.53	.83		8.42	1.23
74	Elizabeth, N. J.	11.26	.14	5.41	1 42	4.17	26.69			.46	4.77	
75	Wilkesbarre, Pa.	9.44	.28	9.66	.86		38.80		.13	1.92	10.80	
76	Kansas City, Kans.	9.53	.95	7.31	4.18		21.20	.31	.23	.73	6.03	2.45
77	Harrisburg, Pa.	6.83		4.47	5.68	.06	35.20		.77	.22	7.54	.76
78	Portland, Me.	6.10		8.76	.61	5.14	20.10	.88	.61	3.55	5.40	2.74
79	Yonkers, N. Y.	9.68	1.04	5.86	2.95	.69	24.90	.53	2.85	.46	4.77	2.04
80	Norfolk, Va.	7.29	.01	5.52	3.17	1.48	6.96	.18	1.15	2.32	1.96	4.23
81	Waterbury, Conn.	9.77	1.13	8.21	.63		42.49	.65	.89	1.58	5.40	2.30
82	Holyoke, Mass.	6.11		9.26	.84	6.38	24.89	.76	.94	.39	3.81	1.07
83	Fort Wayne, Ind.	8.78		15.34	1.32		30.71	1.40	2.92	.59	7.99	2.89
84	Youngstown, Ohio.	10.73	.72	8.49	1.52	3.28	34.93	.69	.37	1.17	5.88	4.86
85	Houston, Tex.	7.79		9.28	3.39		18.24		.28	.48	3.17	
86	Covington, Ky.	8.22	1.53	7.12	3.45	3.86	19.70			.70	4.25	1.85
87	Akron, Ohio.	8.52	.75	10.86	.01	2.12	44.16	2.44	.44	.39	7.20	1.37
88	Dallas, Tex.	8.36	1.26	10.72	4.28		19.08	.75	.61	.02	5.12	2.27
89	Saginaw, Mich.	7.88	.66	7.19	.64	3.41	34.00	.58	.13	.24	4.30	2.08
90	Lancaster, Pa.	6.43		6.13	.61	.56	35.66			.33	11.02	2.29
91	Lincoln, Nebr.	4.46	.43	8.23	.95	.08	33.41	1.25	.02	.70	3.91	.96
92	Brockton, Mass.	6.68		8.61	1.65	6.16	22.10	1.05		1.83	5.14	1.09
93	Binghamton, N. Y.	6.54	.41	5.98	1.29	2.99	35.30	.43	.72	.59	10.20	2.38
94	Augusta, Ga.	11.02	1.05	10.11	1.47	4.26	17.91		.18	.87	4.58	.32
95	Pawtucket, R. I.	7.03		5.79		3.23	20.30	1.08	.36	1.67	5.01	2.16
96	Altoona, Pa.	6.36	.25	8.75	.71		32.20		1.11		5.99	1.79
97	Wheeling, W. Va.	8.39	1.42	9.65	.95	.52	21.54	1.15		.21		2.20
98	Mobile, Ala.	13.86	.40	8.60	.71	3.57	16.48		.65	.98	6.59	1.77
99	Birmingham, Ala.	10.90	3.44	9.28	.85	1.41	12.30		.99	.14	4.18	
100	Little Rock, Ark.	15.54		14.44	.97	3.99	38.41		1.82	.54		
101	Springfield, Ohio.	7.31	1.06	6.78	.84	2.37	27.53	1.00	2.09	.40	8.94	
102	Galveston, Tex.	8.80		11.30	4.20	6.19	21.10	.30	.04	.52		
103	Tacoma, Wash.	5.04	.39	6.72	.60	.43	23.49	.73	.98	1.86		
104	Haverhill, Mass.	5.73		8.50	.63	6.91	21.28	1.09	1.28	.55	6.36	.80
105	Spokane, Wash.	6.59	1.10	12.28	.99	1.36	28.73	.56	1.04	.29	2.03	.93
106	Terra Haute, Ind.	7.54	.24	9.96	1.94	.11	34.51	2.09	.52	.29	6.83	3.10
107	Dubuque, Iowa.	7.63		8.87	.48	.32	25.92		.29	1.30	6.62	3.77
108	Quincy, Ill.	7.65	1.97	10.31	1.29		29.93	1.57	2.28	.82	7.19	1.50
109	So. Bend, Ind.	6.90		11.00	.22		26.70	1.50	.96	.73	6.58	6.20
110	Salem, Mass.	6.97		6.39	2.66	8.59	21.18	1.34	1.14	.58	6.68	1.05
111	Johnstown, Pa.	7.92	.27	4.57	.50		46.80		.69	1.12	8.26	3.65
112	Elmira, N. Y.	7.44		11.50	1.62	2.18	27.60	.42	1.42	2.28	7.92	.79
113	Allentown, Pa.	5.58		8.04	.79		39.74				8.46	.65
114	Davenport, Iowa.	7.65		7.30	1.32		43.80	.11	2.16	.53	2.79	2.80
115	McKeesport, Pa.	10.15		9.71	.95		30.48	.87		.44	5.92	2.61
116	Springfield, Ill.	8.60	1.15	11.90	.60		28.20	.79		.59	6.04	3.69
117	Chelsea, Mass.	5.32		5.21	2.54	8.02	18.86	.59	.21	.67	4.22	.75
118	Chester, Pa.	9.90		6.22	1.78		36.90		.99	.79	8.92	.40
119	York, Pa.	10.18		6.85	1.94	.14	37.69		.16		11.32	
120	Malden, Mass.	5.96		6.03	1.20	7.01	28.10	1.73	.24	.12	5.27	
121	Topeka, Kans.	7.81	.67	8.75	2.95	.54	31.67	1.88	1.69	.42		2.42
122	Newton, Mass.	6.76		5.39	1.78	4.24	18.92	1.52	.38	.40	5.53	2.21
123	Sioux City, Iowa.	5.19	.35	6.72	1.20		27.99	.59	.28	1.68	3.96	1.52
124	Bayonne, N. J.	8.48	.16	2.84	1.33	.68	28.33	.87		.51	6.45	1.37
125	Knoxville, Tenn.	8.67		8.79	.69	3.54	19.93				9.59	
126	Schenectady, N. Y.	7.52	.39	7.56	5.71	2.67	20.57		.15	1.11	8.75	1.83
127	Fitchburg, Mass.	6.99		6.23	.92	9.28	22.35	1.39	.54	1.02	6.35	.98
128	Superior, Wis.	6.34	.56	9.19	2.17	3.35	29.24	1.04		.43	2.95	4.55
129	Rockford, Ill.	5.69	.56	9.94	.65	.39	36.06	2.19	.24	1.25	7.21	3.26
130	Taunton, Mass.	8.66	.22	5.92	.87	7.17	25.02	1.27	.25	.74	1.74	1.83
131	Canton, Ohio.	7.24	.86	11.04	1.25	.99	33.35	.72	.72	2.10	7.79	
132	Butte, Mont.	11.75	1.49	7.59	2.43		34.70	2.36		.05	4.47	2.08
133	Montgomery, Ala.	11.45		7.84	2.76	.46	10.26				5.54	5.80
134	Auburn, N. Y.	6.97	.52	7.15	1.06	5.73	27.99	.69			10.45	2.62
135	Chattanooga, Tenn.	12.31		13.26	5.38	2.53	17.85	.20	1.59	.16	2.41	1.87
136	E. St. Louis, Ill.	10.47	.80	8.71	1.59		25.64	1.86		.82	5.15	12.62
137	Joliet, Ill.	11.98		12.23	1.87	.84	27.62	1.59	2.25	.59	6.86	2.86

[1] Percentages obtained from data published in Bulletin No. 42 of the Department of
(b) No data for school expenditures.

No. 2 (*Continued*)

devoted to each of the municipal departments for the fiscal year 1901 [1]

above 30,000 population

Street sprinkling.	Other street expenditures.	Garbage removal.	Interest on debt.	Waterworks.	Gas-works.	Electric-light plants.	Docks and wharves.	Ferries and bridges.	Markets.	Cemeteries.	Baths.	Other items.	
.19	6.63	6.81	25.57	4.60			.09		.83	.89		11.30	69
3.17	2.55	1.28	21.31	4.73						1.14		11.14	70
.90	13.40	2.60	22.16									13.50	71
.74	3.95		28.12	3.62	3.48			2.31	.07			12.22	72
	2.81		8.69	14.17			.16	.12				10.09	73
	5.65	1.49	26.92									11.60	74
	10.30		6.56							.55		10.80	75
	2.94		25.84					1.47		.06		16.72	76
	8.05	.13	12.80	6.44				.02				11.00	77
	6.85	.55	11.90					1.33		3.51	.03	22.00	78
.89	2.94	3.77	19.50	6.58				.08	.23		.28	9.84	79
.13	5.12		29.45	7.52				.40	.05	1.00		22.01	80
	3.60	3.77	14.50	4.11								1.33	81
1.15	2.00	2.16	11.77	3.51				.22			.07	24.64	82
.04	2.47	1.99	6.43	6.59				.43	.08			9.99	83
	2.22	.31	7.93	6.17								10.76	84
	8.54	2.69	22.32	4.84				.03				19.29	85
	5.89		18.44	8.64					.02			16.29	86
1.45			5.69					.49				14.14	87
.62	4.79	.36	23.29	7.04								10.59	88
	6.40	.73	13.50	6.11			.12	1.39		1.12		10.20	89
	5.71	2.49	9.90	10.37								8.50	90
	2.55	.13	24.92	6.81				.31		.79		10.06	91
1.57	12.60	1.26	14.40	2.55						.45		12.90	92
.15	4.52		4.30	6.58				.27				17.40	93
.40	1.08	.95	18.99	6.11				.39		1.46		18.89	94
1.30	3.67	.54	26.60	9.02				.03		1.05		11.50	95
	4.78		13.80	7.66				.20	.31			16.10	96
	.23	1.95	5.99	11.66	18.25	5.19			.48	.32		9.84	97
	9.52		13.35	8.29			.43		1.36	1.42		12.07	98
	7.22	4.03	28.91					.28		.51		15.55	99
	5.89		2.79			4.99				.54		10.07	100
	11.73	.65	13.06	4.77				1.41	.67	.08		9.23	101
	5.48		20.00	6.47		5.14			.05	.41		10.10	102
	3.83		32.69	4.69		9.91	.35					8.32	103
1.56	7.37	.47	21.23	3.46				.45		.07		11.36	104
.74	2.90		26.41	2.87				.70				10.43	105
.12	2.29	1.32	5.30							1.25		22.50	106
	7.06	.61	17.70	5.31					.02			13.85	107
	3.03	.89	17.58						.04	.35		13.52	108
	6.08		12.10	9.11				1.16		.55		10.40	109
.74	8.40	.47	9.42	6.18				.29	.11	1.18		16.36	110
	2.28		12.80					.36	.09			10.80	111
	6.50		5.65					1.25		1.79		21.60	112
	4.30	1.29	13.52	11.00								6.61	113
2.54	3.15	1.38	5.08					1.41				17.91	114
	2.56	.44	8.98	8.64								18.21	115
	2.11		13.80	6.99						2.88		12.60	116
1.39	4.20	1.39	8.71	2.38								35.47	117
	4.82	.79	12.80									15.70	118
	7.77	7.25	9.70						.07			7.28	119
1.68	10.97	1.82	8.60	6.19						1.48		13.54	120
.06	7.65	.18	16.00			4.07		.11				13.08	121
1.44	12.45	1.01	25.37	1.72						.02	.04	10.79	122
	8.06	1.88	23.63	5.38				2.39		.09		9.05	123
.08	1.15	1.31	20.13	2.35			.04					23.55	124
	6.74		28.56									13.46	125
.37	5.28		12.70	12.91				.39				12.03	126
.87	8.57	.57	16.58	6.22				1.59		1.22		8.29	127
	22.45							.60				17.06	128
	6.23	.62	8.33	9.98				.38				6.95	129
	7.06	.24	17.47	5.11		6.32				.46		9.63	130
	.66		12.43	10.49					.01			10.31	131
2.31	6.59	.52	6.66									16.95	132
		1.65	30.85	15.36					.42	.91		6.67	133
	6.61	1.34	7.60	6.81						.23		14.17	134
.09	7.47	2.48	18.30					.70				12.99	135
	13.59											18.39	136
	11.75	1.29	3.40	6.23								8.58	137

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Before subjecting to interpretation the gross amounts of expenditures for 1900 and 1901 for the various items, certain minor corrections of these amounts were made, with the aid of the explanatory notes accompanyng the tables. Wherever an amount not properly belonging to the municipal accounts, as, for instance, expenditures in which the city acted as agent of the county in fulfilling some function of county government, had been included in the gross expenditures, such amounts were deducted. Wherever an amount properly belonging to the municipal budget had not been included, it was added to the amount of the gross expenditures. These additions were practically all due to amounts expended by state and county upon public schools. The total number of corrections was very small—not over six or eight on either of the two tables.

Transformation of Gross Itemized Expenditures to a Percentile Basis.—The first operation was to transform the gross itemized expenditures to a percentile basis. This process, even by the use of indispensable labor-saving devices, was of necessity a long and tedious one. These transformed percentile amounts are contained in Tables 1 and 2 (pages 18–25) and form the immediate basis for the operations which are described later on.

The primary advantage of making comparisons on a percentile basis rather than on one of gross or per capita amount consists in placing, as it were, all cities whether large or small in the same category, thus giving a definite series of comparable statistics for the city as a *type*. The apparent disadvantage consists in a chance of placing the so-called expensive, efficient, and well-governed city in the same class with the parsimonious and possibly inefficient and undesirable community. For example, one of two cities of about equal size might have a budget of twice the amount of the other; it might spend twice as much as the other on its schools, fire, health, street, and police departments. On the percentile basis these two cities would be placed on an equality. The necessary provisions for correcting this disadvantage will be explained as the occasion renders it necessary in the interpretation of the results.

V. Variability of Expenditures

General Statement.—Even a superficial examination of the tables, giving the itemized percentile expenditures, discloses a

remarkable range in the percentile amounts in the identical municipal departments of the different cities. This variability is not confined to cities of great differences in population or location. Even within a comparatively small population or territorial group, a wide divergence in the percentile distribution of the total amount of the budget among the various items is prominent.

The percentile expenditures assembled from the data of Table 1, and given in Table 3 are illustrative of this divergence. The cities concerned were selected at random. Cities 7, 8, and 9 are cities of from 350,000 to 400,000 population, located respectively in the eastern, central, and extreme western portions of the country. Cities 36, 37, and 38 are respectively eastern, southern, and western communities, and are each of approximately 100,000 population. Cities 81, 95, 120, and 126 are New York or New England cities of from 30,000 to 50,000 population.

TABLE NO. 3

Typical examples of variability of percentile expenditures. Statistics for year 1900. (Read across)

City No.[1]	7	8	9	36	37	38	81	95	120	126
Police Department, Courts, Jails, etc..	10.55	13.51	16.78	10.28	11.20	8.57	9.92	6.80	5.23	11.13
Fire Department....	9.83	11.00	9.88	9.14	9.41	7.39	7.66	5.40	5.39	6.36
Health Department.	1.54	.72	1.66	.91	7.46	.71	.71		2.58	1.82
Hospitals and Charities.....	2.73	2.60	3.82	.29	3.55			2.62	6.35	2.37
Schools.....	23.70	19.10	20.90	32.70	15.90	48.60	39.50	17.70	21.90	24.50
Libraries and Museums.....	1.65	1.65	.75	1.39	.70	1.42	.24	.99	1.53	.61
Parks.....	.79	3.21	2.66	4.08	.23	.64	.24	.11	1.23	.17
Sewers.....	.69	.20	.82	.31		1.03	1.18	1.46	1.42	1.48
Municipal Lighting..	5.15	5.79	3.94	3.27	5.17	6.37	5.18	4.51	4.63	7.12
Street Cleaning.....	1.20	2.98	2.70	6.49	3.06	1.85	2.01	1.61	1.86	6.42
Other Street Expenditures.....	1.99	4.02	3.13	5.91	10.30	2.06	2.24	4.60	10.90	6.01
Garbage removal....	1.50	1.86		.82		.43	1.65	.52	1.63	.24
Interest on debt....	14.40	10.90	.25	4.89	18.60	8.06	12.60	25.00	8.12	16.10
Waterworks.....	5.89	5.86					4.56	19.50	5.31	12.30
Gas-works.....										
Electric-Light Plants										
Docks and Wharves.		.76			.76					
Ferries and Bridges.	2.25	.18	.10		2.35	.69			.08	.47
Markets.....	.45	.23			.67					
Cemeteries.....	.65	.01						.70	1.36	
Baths, etc.....		.02								
Other items.....	15.10	15.40	32.50	19.40	10.60	12.30	12.20	8.56	20.60	2.92
Total.....	100.06	100.00	99.79	99.88	99.96	100.12	99.89	100.08	100.12	100.02

Tables of Frequency.—The data of Table 4 present the so-called tables of frequency for certain items of expenditure, for which complete and fairly reliable information was given in the

[1] For names of cities, consult Table 1, pp. 18–21.

original tables for all, or approximately all, of the cities. These items were selected for study because they pertained to important municipal functions, and also because the original data, from which the percentile data were developed, presented these expenditures in a clear manner, free from apparent admixture with other items.

TABLE NO. 4

Tables of frequency. Percentile expenditures for maintenance and operation
All cities in the United States above 30,000 population
Fiscal years 1900 and 1901

Per cent.	(a) Police Department. Frequency. 1900	Frequency. 1901	Average. 1900–1901	(b) Police Department, Police Courts, Jails, Workhouses, Reformatories, etc. Frequency. 1900	Frequency. 1901	Average. 1900–1901
2	1	0	0	0	0	
3	2	0	2	1	0	
4	3	2	3	4	1	
5	13	10	10	15	9	
6	15	24	19	13	21	
7	23	19	17	16	16	
8	14	22	22	22	23	
9	16	14	13	17	15	
10	3	7	6	10	11	
11	8	10	9	8	16	
12	6	2	3	4	6	
13	4	6	4	10	6	
14	3	1	1	5	4	
15	0	1	1	1	3	
16	1	1	0	4	2	
17	1	0	1	0	1	
18	0	1	1	0	1	
19	1			2	1	
20				1	0	
21					0	
22					1	
Total,	114	120	112	133	137	

		(c) Fire Department.			(d) Street Lighting.		
Below	1	0	0	0	1	0	
	1	0	0	0	5	2	
	2	1	1	1	7	12	
	3	2	0	0	14	9	
	4	5	5	7	25	24	
	5	16	12	14	25	33	
	6	17	16	14	20	24	
	7	21	23	23	13	10	
	8	18	28	23	10	9	
	9	20	17	22	5	3	
	10	13	15	12	2	5	
	11	9	11	8	3	2	
	12	4	4	4			
	13	4	2	1			
	14	2	2	3			
	15		1				
Total,		132	137	132	130	133	

On account of the very small difference in variability between the two years (median, 1900, 8.82; 1901, 8.88) the *average* percentile expenditures were not calculated.

TABLE NO. 4 (*Continued*)

Tables of frequency. Percentile expenditures for maintenance and operation. All cities in the United States above 30,000 population Fiscal years 1900 and 1901

	(e) Schools.				(f) Libraries, Museums, Art Galleries.		
Per cent.	Frequency. 1900	Frequency. 1901	Average. 1900–1901	Per cent.	Frequency. 1900	Frequency. 1901	Average. 1900–1901
6	1	1	1	Below .1	4	2	
7	1	0	0	.1	3	4	
8	0	0	1	.2	2	3	
9	0	1	0	.3	9	2	
10	3	1	2	.4	6	3	
11	1	1	0	.5	7	7	
12	1	2	2	.6	8	11	
13	2	2	1	.7	5	9	
14	1	1	3	.8	6	8	
15	5	2	1	.9	2	5	
16	3	2	2	1.0	11	10	
17	10	6	8	1.1	7	7	
18	7	6	6	1.2	4	6	
19	3	9	8	1.3	4	6	
20	7	10	8	1.4	5	3	
21	11	10	7	1.5	4	9	
22	6	5	5	1.6	4	3	
23	7	7	7	1.7	6	4	
24	6	3	9	1.8	3	2	
25	8	6	10	1.9	2	1	
26	4	6	6	2.0	1	1	
27	3	7	3	2.1	0	2	
28	6	8	5	2.2	0	0	
29	1	5	3	2.3	2	2	
30	3	4	3	2.4	1	1	
31	4	2	2	2.5	0	1	
32	4	2	2	2.6	0		
33	3	5	4	2.7	0		
34	5	4	5	2.8	1		
35	4	4	4				
36	2	4	5	Total,	107	112	
37	3	1	1				
38	1	2	2				
39	3	1	2				
40	1	1	1				
41	0	1	1				
42	0	1	0				
43	0	1	0				
44	0	1	0				
45	1	0	1				
46	0	1	1				
47	0						
48	1						
Total,	132	136	132				

On account of the very small difference in variability and central tendencies between the two years (median, 1900, 1.02; 1901, 1.015) the *average* percentile expenditures were not calculated.

TABLE NO. 4 (*Continued*)

Tables of frequency. Percentile expenditures for maintenance and operation
All cities in the United States above 30,000 population
Fiscal years 1900 and 1901

Per cent.	(*g*) Health Department. Frequency. 1900	Frequency. 1901	Average. 1900–1901	(*h*) Parks. Frequency. 1900	Frequency. 1901	Average. 1900–1901
Below .1	1	1	0	2	2	
.1	1	1	0	10	8	
.2	2	3	3	9	12	
.3	4	1	2	2	5	
.4	9	4	8	6	1	
.5	9	4	7	6	5	
.6	6	14	11	5	5	
.7	14	10	8	3	6	
.8	8	15	10	5	6	
.9	15	12	11	8	10	
1.0	5	4	9	2	3	
1.1	4	7	8	4	4	
1.2	9	6	3	5	1	
1.3	7	8	5	4	6	
1.4	3	3	6	2	5	
1.5	2	5	4	3	3	
1.6	4	4	9	0	4	
1.7	0	3	3	6	2	
1.8	6	2	2	4	2	
1.9	2	5	2	3	2	
2.0	2	3	1	1	2	
2.1	0	1	0	3	1	
2.2	2	0	0	1	5	
2.3	2	0	1	1	4	
2.4	1	1	2	2	1	
2.5	3	1	1	4	0	
2.6	1	1	2	3	1	
2.7	0	2	2	0	1	
2.8	0	0	2	3	3	
2.9	1	4	0	0	1	
3.0	1	0	0	1	1	
3.1	0	1	0	0	1	
3.2	0	0	1	2	0	
3.3	0	1	1	1	0	
3.4	0	1	1	0	2	
3.5	0	0	0	0	0	
3.6	0	0	0	1	2	
3.7	0	0	1	0	1	
3.8	0	0		0	0	
3.9	0	0		0	0	
4.0	0	0		1	1	
4.1	0	1		0	1	
4.2	0	2		0	1	
4.3	0			0		
4.4	1			1		
Also: at 5.8	1	Also: at 5.3 1; " 5.6 1; " 5.7 1; " 7.2 1; " 8.4 1		Total, 114	121	
Total,	126	136	126			

On account of the very small difference in variability and central tendencies between the two years (median, 1900, 1.045; 1901, 1.05) the *average* percentile expenditures were not calculated.

Explanation of Tables of Frequency.—Table 4(*a*) contains the facts of the distribution of the percentile expenditures for the police department. Column 1 gives the range of percentile expenditures; column 2 gives the number of cities, in accordance with the statistics of Table 1, spending any certain per cent. of their gross expenditures for the maintenance and operation of the police department for the year 1900.[1] Column 3 gives similar information for the year 1901; column 4 represents the average percentile expenditures for the years 1900 and 1901. The totals are of the number of cities for which information is given for any year. Thus the first line of Table 4(*a*) would read as follows: In 1900, one city spent 2 %[2] of its gross expenditures for maintenance and operation upon its police department; no city spent this per cent. in 1901; and there were no cities with an average percentile expenditure of 2 % for the police department. The fourth line of this table would read as follows: In 1900, 13 cities each spent 5 % of their gross expenditures for municipal maintenance and operation for the maintenance and operation of police service; in 1901, 10 cities each spent this per cent.; according to the average of the two years, 10 cities spent this per cent.

Table 4 (*a*) does not contain the data for all the cities. This was due to the fact that many cities do not separate in their accounts the expenditures for the police department from those incurred by reason of jails, police courts, etc. The data for this combined item are presented in Table 4(*b*).

The remaining divisions of the table are similar in nature to division (*a*) and need no further explanation.

Graphical Representation of Variability.—Figures 1 to 10, pp. 32–34, represent diagrammatically the tables of frequency. In the case of those items for which an *average* percentile expenditure has been calculated, the diagrams reflect the numerical facts of this average. Where no average has been calculated

[1] Throughout these explanations the year 1900 has reference to the data contained in the Bulletin 36 of the Department of Labor, published in September, 1901; the year 1901, to Bulletin 42, published in September, 1902.

[2] Throughout all the tables of frequency, any percentile figure must be read to mean from that figure to the next higher one. Thus 2 % really means a point between 2 % and 3 %; 3 %, a point between 3 % and 4 %, etc.

FIG. 1.

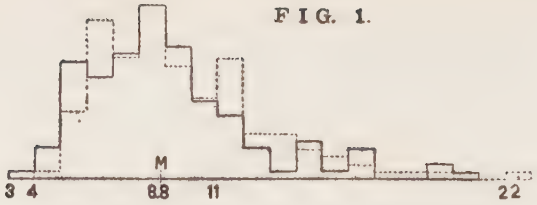


FIG. 2.

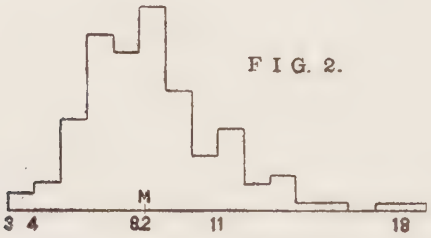


FIG. 8.

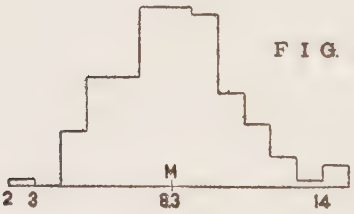
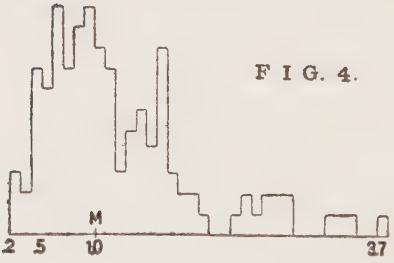


FIG. 4.



SURFACES OF FREQUENCY—PERCENTILE EXPENDITURES

Fig. 1.	Police Department, Police Courts, Jails, etc. (Heavy line) 1900, (Dotted line) 1901.	Median, 8.8.
Fig. 2.	Police Department. Average of 1900 and 1901.	Median, 8.2.
Fig. 3.	Fire Department. Average of 1900 and 1901.	Median, 8.3.
Fig. 4.	Health Department. Average of 1900 and 1901.	Median, 1.03.

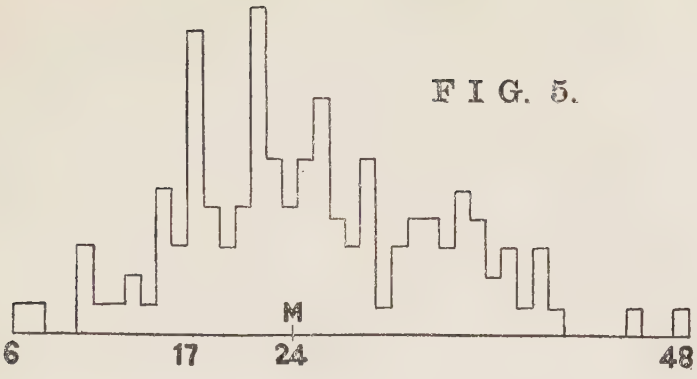


FIG. 5.

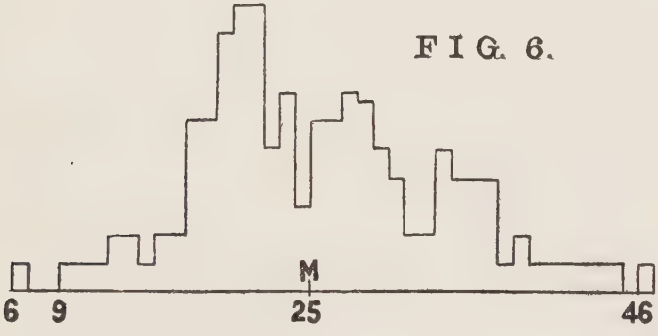


FIG. 6.

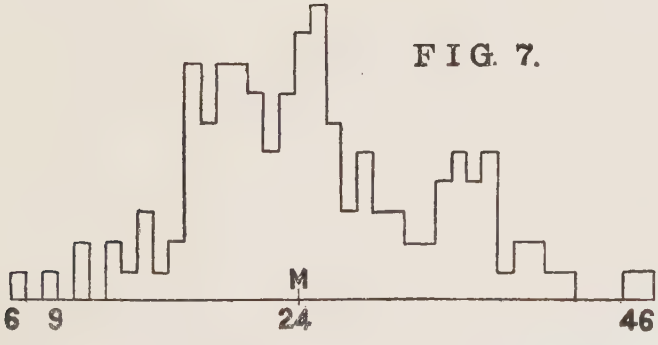


FIG. 7.

SURFACES OF FREQUENCY—PERCENTILE EXPENDITURES

Fig. 5.	Schools, 1900.	Median, 23.6.
Fig. 6.	Schools, 1901.	Median, 24.96.
Fig. 7.	Schools, average 1900 and 1901.	Median, 24.3.

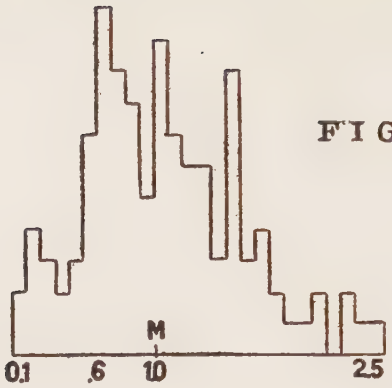


FIG. 8.

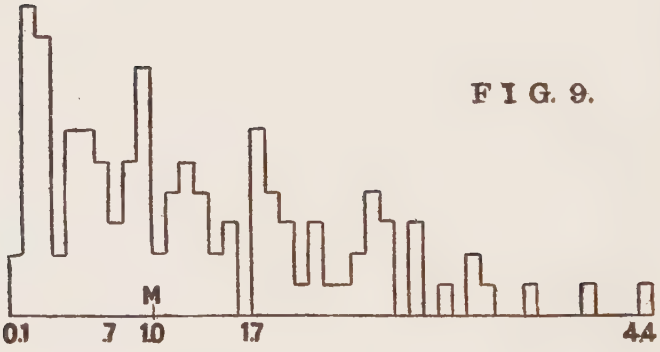


FIG. 9.

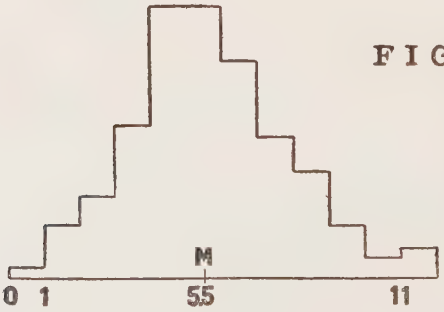


FIG. 10.

SURFACES OF FREQUENCY—PERCENTILE EXPENDITURES

Fig. 8. Libraries, Art Galleries, and Museums, 1901. Median, 1.01.
Fig. 9. Parks and Gardens, 1900. Median, 1.04.
Fig. 10. Municipal Lighting, 1900. Median, 5.5.

the frequencies of both years are presented, the heavy continuous line representing the frequencies for the first year, and the broken line the frequencies for the second year. In the case of the expenditures for schools the three sets of frequencies are represented separately. The horizontal distance represents in every case the per cents., while the vertical distance represents the number of cases.

These graphical representations enable one to comprehend at a glance some of the more significant characteristics of the tables of frequencies, which are often concealed from the unaccustomed observer in the distribution series of Table 4.

VI. Measurement of Variability

In their present distributed and graphically represented condition, the measures entering into the tables of frequency merely give us an index to the principal, gross facts, viz., the *spread* of the measures. That is, we know that, of the cities studied, some spend 3 %, some 4 %, some 5 %, and so on, until we find one city spending 18 %[1] of its total expenditures for the maintenance of its police service (Table 4 (*a*)). If the expenditures for the police department, police courts, jails, etc., are placed in a single amount, this variation is found to be from 4 % to 22 % of the gross total (Table 4 (*b*)). For schools, we find it to be from 6 % to 46 % of the gross total (Table 4 (*c*)). These facts, while perhaps interesting enough in themselves, give us but a partial insight into the true condition of affairs. As they now stand, they do not enable us to describe with any exactness the character of the different variabilities, nor to state any of the definite relations which may exist between the different items of expenditure.

There are at least three methods of attaining some definite and comparable measures of the variability.

Method of the Probable Error.—By the first method, the extreme cases, *i.e.*, those very high and those very low, may be excluded. Excluding in this manner from our tables of frequency the low 25 % and high 25 % of the cases under each

[1] It is evident that the figures in the column of *average* percentile expenditures are more reliable, and more nearly indicative of the real measures, than the percentile expenditures for any one year, hence wherever possible in these explanations the *average* figures have been used.

item, there would remain a middle 50 %. It is evident that the limits of this middle 50 % of the cases give a truer measure of the variability of the group of cities in any single item of expenditure than the limits within which all the cases lie. This is particularly true with such items as schools, libraries, health, and parks, in which a wide range of variability is exhibited.

Actually performed, and calling the new limits + and − P. E. (Probable Error), the following table of results would be found:

TABLE 4A

Table of measures of variability of percentile expenditures for maintenance and operation. All cities in the United States above 30,000 population. Fiscal years 1900 and 1901

	50 % of the cases lie between			2 P. E.
Police Department (average)	6.93 %	and	9.82 %	1.89
Police Department, Courts, Jails, etc. (1901)	7.43	"	11.22	3.79
Fire Department (average)	6.72	"	9.70	2.98
Municipal Lighting (1901)	4.39	"	6.72	2.33
Libraries, Museums, etc. (average)	.66	"	1.40	.74
Health Department (average)	.7	"	1.6	.9
Parks (1901)	.54	"	1.90	1.36
Schools (average)	19.65	"	30.58	10.97
Interest on Debt (average)	8.84	"	19.15	10.31

In other words, while the cities in 1901 exhibit a variability of 19 % (from 4 % to 23 %) in their expenditures for police department, courts, jails, etc. (Table 4 (*b*)), one half of these cities lie within a variation of but 3.5 % (from 7.5 % to 11 %). Also while the *average* percentile expenditures for two years of 132 cities for schools exhibit a variability of 40 % (Table 4 (*e*)), one half of these cities lie within a variation of but 11 % (from 19.65 % to 30.58 %). Although, from the data at hand, it would be entirely correct to say that, among American cities having 30,000 or more population, the expenditures for schools varied from 6 % to 46 % of the total expenditures for maintenance and operation, such a statement would be manifestly unfair as defining the essential characteristics of the group.

Method of Deviation from Central Tendency.—The second method of measuring the variability of expenditures in any item is by means of the amount by which each member of the group of cities deviates from some central tendency, such as the average or the median. The median is the point above and

below which 50 % of the cases lie. By reason of its lack of ambiguity and less likelihood of being influenced by extreme cases, the median is preferable to the average under conditions such as the present.

Table 5 contains the medians, and the deviations from the medians, of the *average* percentile expenditures for 1900 and 1901, for the eight indicated items. The first line of the table contains the average *median* expenditure for the designated items. That is to say, one half of the cities spent *more* than 8.20 % of their total expenditures for police service; one half of the cities spent *less* than 8.20 %. The average median expenditure for schools was 24.31 %; and so on. Opposite the number of each city is placed the amount by which the percentile expenditure of that city for any particular item deviates, above or below the median percentile expenditure for that item. For example, city 22 had an average percentile expenditure for schools of .96 % below the average median percentile expenditure of the entire group of cities. All deviations below the median are indicated by a minus sign. All deviations without the sign are to be interpreted as plus.

Having thus obtained the individual measures of the deviations, it is possible to combine these measures and reach certain conclusions regarding the character of the deviations for the entire group. Such group measurements would be the average amount of the deviation, *i.e.*, the sum of all the deviations divided by the number of each; or the limits within which lie the deviations of one half of the cities from the central tendency of any item of expenditure; or a more accurate measure yet of this group deviation, the square root of the average of the squares of the deviations of the individual measures from their median—the so-called mean square deviation, or standard deviation.

As these measures are concerned more directly with the methods of calculating the group relationships, an explanation of their meaning and importance will be reserved for the section on correlation. The main observation to be made here is the necessity of utilizing some definite measures of the amount of the deviation of the expenditure for any item from the central tendency of that expenditure before it is possible to generalize concerning the characteristics of the total number of cities.

Table No. 5

Medians, and deviations from medians, of percentile expenditures, for maintenance and operation, of all cities in the United States, having a population of 30,000 and over. Average for fiscal years 1900 and 1901

No. of city.	Police department.	Police department, courts, jails, workhouses.	Fire department.	Health department.	Municipal lighting.	Parks and gardens.	Schools.	Libraries and museums.	No. of city.
Median	8.20	8.85	8.27	1.03	5.52	1.05	24.31	1.02	Median
1	1.83	2.20	−3.64	− .01	−2.98	.48	− 7.25	− .38	1
2	9.73	10.36	−2.42	*	−1.86	2.31	10.02	− .10	2
3	6.89	10.80	−2.88	.36	.57	1.45	− 7.07	.32	3
4	9.89	10.54	.14	.52	.68	.26	− 7.15	− .58	4
5	.14	5.40	−2.21	− .16	−1.85	1.16	−10.07	.40	5
6	3.72	5.30	−2.01	.08	− .77	1.97	− 7.30	− .73	6
7	.47	1.98	1.72	.27	− .26	.16	.63	.67	7
8	5.11	4.86	3.10	− .27	.35	2.27	− 4.85	.65	8
9	5.90	7.61	2.52	.37	−1.40	1.70	− 3.96	− .24	9
10	1.21	2.54	− .41	− .35	− .01	− .37	− 6.56	.24	10
11	.37	− .28	.82	.42	− .33	1.90	− 9.76	.66	11
12	2.71	−2.36	−2.05	.08	− .45	− .81	−13.55	− .81	12
13	6.48	6.13	5.89	.00	−2.53	1.74	−14.00	.51	13
14	1.05	1.13	3.50	.02	.40	.60	− 3.54	.67	14
15	4.07	9.12	−3.74	.24	−1.16	.22	− 3.54	− .87	15
16	*	1.58	−1.15	.55	− .49	− .94	− 4.26	− .18	16
17	*	2.39	−2.28	− .83	−1.30	− .82	−11.86	− .20	17
18	1.62	4.76	.07	− .74	− .38	.64	− 6.12	*	18
19	− .84	− .64	2.86	− .19	− .34	1.38	1.01	.41	19
20	2.06	1.10	1.58	− .44	2.68	.73	− 4.66	− .73	20
21	1.28	.78	2.13	− .21	1.14	3.00	8.64	1.18	21
22	2.40	2.89	2.19	1.52	−2.07	1.95	− .96	− .04	22
23	− .57	.33	− .06	− .63	1.23	1.32	− 2.84	− .39	23
24	−2.37	−2.56	−1.22	.02	2.26	− .12	− 7.77	− .91	24
25	− .17	− .17	.02	.41	− .11	2.63	12.26	.26	25
26	1.21	− .24	− .79	− .70	− .50	.97	1.31	− .30	26
27	.57	−1.22	− .45	− .18	− .88	.50	.41	.52	27
28	1.21	− .39	−1.25	.15	−1.65	− .45	− 1.28	− .44	28
29	−2.21	−2.86	−1.55	.19	− .65	− .50	− 2.76	.28	29
30	−1.41	−1.40	.17	.06	1.63	.58	− 4.47	.53	30
31	5.35	5.85	1.56	− .50	.20	.41	2.16	.02	31
32	1.80	1.44	.63	− .41	1.21	.99	1.03	.33	32
33	.39	− .26	− .68	.22	.56	− .89	− 5.16	− .04	33
34	1.49	1.97	1.57	− .10	−1.69	.02	− 1.28	.02	34
35	−2.33	−2.23	− .13	− .48	− .10	.31	2.05	.21	35
36	.77	.73	.54	− .13	− .96	3.10	8.92	.32	36
37	*	2.30	1.33	*	− .25	− .77	− 8.66	− .38	37
38	− .35	− .50	− .83	− .12	.72	− .44	20.69	.34	38
39	1.75	1.90	.20	.57	1.05	− .16	.17	.09	39
40	2.89	2.69	1.58	.00	.12	1.77	− 2.93	− .48	40
41	*	−3.02	−4.08	− .15	−2.21	− .08	− 3.42	− .18	41
42	−2.94	−3.15	− .37	− .58	− .78	.03	1.14	*	42
43	*	4.07	2.08	*	1.25	.73	− 9.90	− .47	43
44	− .13	.35	3.35	.40	−3.29	1.67	4.46	− .30	44
45	.40	1.29	.02	− .29	− .15	− .83	8.89	.05	45
46	.13	− .17	− .88	− .30	−2.89	.74	−14.09	− .65	46
47	*	2.42	2.23	.89	.15	*	− 3.66	− .56	47
48	−1.26	−1.32	.02	.09	−3.08	.09	− 3.08	.35	48
49	.57	.45	.25	− .18	−1.37	1.01	1.02	− .23	49
50	.25	− .40	−1.98	− .43	4.06	.85	5.14	− .45	50
51	4.10	3.98	−2.70	− .05	1.40	1.26	3.19	.03	51
52	4.01	7.29	1.98	− .43	4.25	− .87	2.49	− .84	52
53	2.90	2.66	1.19	− .21	−2.12	.67	.14	− .37	53
54	.33	.74	− .02	− .27	1.78	1.52	− 1.11	.65	54
55	−1.82	−2.97	− .72	− .12	−1.37	− .41	− 5.35	.45	55
56	2.67	3.14	2.88	.66	3.14	− .02	14.94	.96	56
57	− .52	−1.17	−1.26	3.35	−1.25	− .24	− 2.24	.45	57
58	2.87	2.22	− .80	1.84	− .50	1.03	− 2.74	.38	58
59	−1.80	−1.76	2.03	3.39	1.21	2.04	14.39	.31	59
60	−2.73	−3.38	− .11	− .48	− .22	.95	4.50	1.47	60
61	*	−3.00	−2.45	− .18	− .34	− .11	2.38	.40	61
62	3.11	2.86	−1.80	1.62	2.40	− .79	− 4.37	*	62
63	5.38	5.15	1.70	− .28	−2.23	− .48	− 1.05	.02	63
64	.69	.37	1.87	− .60	− .31	− .80	6.27	*	64
65	−1.32	−1.53	5.29	.64	3.65	− .19	− 5.01	− .18	65
66	−1.87	−2.16	2.90	.59	4.06	− .29	.85	− .02	66
67	1.14	2.78	1.22	− .03	.58	2.48	5.74	.63	67
68	5.54	4.57	− .15	.95	− .84	.25	−11.78	− .93	68

* No data given in Tables 1 and 2.

TABLE No. 5 (*Continued*)

Medians, and deviations from medians, of percentile expenditures, for maintenance and operation, of all cities in the United States, having a population of 30,000 and over. Average for fiscal years 1900 and 1901

No. of city.	Police department.	Police department, courts, jails, workhouses.	Fire department.	Health department.	Municipal lighting.	Parks and gardens.	Schools.	Libraries and museums.	No. of city.
69	*	*	*	*	*	*	*	*	69
70	−3.24	− .03	−2.95	− .34	−1.67	− .10	− 7.68	− .28	70
71	*	− .05	− .45	.97	*	1.23	− 3.70	*	71
72	−4.45	−3.68	.80	− .45	−3.16	.14	− 1.70	− .26	72
73	−1.17	−1.31	3.58	.37	2.81	− .22	7.35	.75	73
74	1.75	1.23	−3.58	*	−1.00	*	− .62	*	74
75	1.27	1.36	1.71	− .17	5.11	− .91	14.94	*	75
76	.53	.72	−1.26	1.46	.60	− .65	.14	− .68	76
77	−1.10	−1.75	−3.36	3.21	2.17	− .54	10.19	*	77
78	−2.39	−3.04	− .49	− .59	− .84	− .15	− 5.66	− .27	78
79	1.35	1.73	−3.82	1.39	.40	1.50	− 6.11	− .53	79
80	− .84	−1.43	−2.48	1.85	−3.17	.20	−17.40	− .83	80
81	1.08	1.56	− .34	− .36	− .24	− .48	16.68	− .57	81
82	−1.97	−2.37	.94	− .32	−1.61	− .46	1.74	− .42	82
83	.32	− .34	6.35	.08	2.12	1.82	5.40	1.08	83
84	2.87	3.07	.40	.65	.73	− .80	11.01	− .47	84
85	*	− .50	1.37	*	−2.92	− .68	− 6.24	*	85
86	− .32	.54	− .88	1.64	−1.86	*	− 4.56	*	86
87	− .19	− .05	3.76	− .64	2.06	− .40	2.97	.54	87
88	− .02	.50	.92	.88	− .50	− .44	− 5.97	*	88
89	− .84	− .78	−1.29	− .68	− .43	− .91	10.24	− .60	89
90	−1.27	−1.92	−1.78	− .39	5.57	*	10.02	*	90
91	−4.10	−4.23	− .28	− .70	−1.17	−1.02	9.86	.12	91
92	−1.86	−2.53	.14	.30	− .95	*	− 3.11	.35	92
93	−1.02	−1.22	−2.12	.53	5.16	− .22	11.84	− .62	93
94	3.51	3.83	2.93	.55	− .52	*	− 6.56	*	94
95	−1.29	−1.93	−2.68	*	− .82	− .81	− 5.61	− .10	95
96	−1.68	−2.03	− .01	− .29	.61	*	8.84	*	96
97	− .56	.09	.83	.06	*	*	− .99	.15	97
98	*	*	*	*	*	*	*	*	98
99	3.55	6.35	1.09	.58	− .90	− .33	−11.31	*	99
100	*	6.07	5.83	.76	− .93	*	11.95	*	100
101	−1.42	−1.17	−1.69	− .37	3.26	1.28	3.71	.06	101
102	*	*	*	*	*	*	*	*	102
103	−4.29	−4.62	−2.74	− .60	*	− .24	− 7.11	− .47	103
104	*	−3.28	.24	− .43	.64	.22	− 3.02	.68	104
105	−1.63	−1.37	3.62	.12	−3.66	− .28	.51	− .54	105
106	− .26	− .17	2.11	.42	1.57	− .51	10.85	.90	106
107	− .42	−1.06	.49	− .57	1.17	− .72	3.05	*	107
108	− .44	1.54	2.08	.31	1.74	.83	4.11	.64	108
109	− .91	−1.57	2.53	− .77	1.00	.31	5.19	.27	109
110	−1.61	−2.25	−2.36	1.78	1.05	.02	− 3.72	.25	110
111	.03	− .35	−3.54	− .55	2.31	*	21.89	*	111
112	*	− .70	4.30	.59	3.17	.29	.79	− .64	112
113	*	−3.81	.43	− .27	2.73	*	14.01	*	113
114	− .63	−1.28	− .94	.65	− .71	.93	17.39	*	114
115	*	.57	1.63	.14	.28	*	6.33	*	115
116	.74	1.13	4.37	− .46	.81	*	4.54	− .87	116
117	−1.87	−2.52	−2.15	1.35	− .46	.80	− 2.13	− .21	117
118	1.53	.87	−2.57	.31	3.35	.34	11.44	*	118
119	1.81	1.16	−1.04	− .11	6.07	− .87	12.68	*	119
120	−3.10	−3.25	−2.56	.86	− .58	− .31	.69	.61	120
121	− .98	− .94	.24	1.73	−1.87	.75	9.43	.57	121
122	−1.96	−2.61	−2.89	.76	− .54	− .63	− 6.86	.43	122
123	−3.00	−3.25	−1.72	.08	−1.37	− .74	3.28	− .43	123
124	− .18	− .66	−5.85	− .60	1.06	*	1.26	− .17	124
125	*	.06	1.01	− .38	4.02	*	− 5.24	*	125
126	.76	.67	−1.31	2.74	2.40	− .88	− 1.77	*	126
127	−1.42	−2.07	−2.38	− .40	.66	− .48	− 2.28	.57	127
128	−2.84	−2.96	− .05	.75	−3.09	*	1.86	− .21	128
129	−2.67	−2.75	1.02	− .39	1.91	− .80	11.17	1.00	129
130	.25	− .24	−2.57	− .23	−3.75	− .79	− .05	.39	130
131	*	−1.57	1.39	− .47	1.35	− .34	8.22	− .47	131
132	3.48	4.35	1.72	1.73	−1.11	*	12.34	1.35	132
133	*	1.86	− .75	1.58	− .31	*	−15.47	*	133
134	*	−2.56	−1.70	− .80	3.75	*	1.64	− .38	134
135	*	2.60	3.96	− .55	.82	.51	− 7.88	− .87	135

* No data given in Tables 1 and 2.

Coefficient of Variability.—It is evident that the mere gross percentile figures do not permit us to say which one of the items under consideration tends to vary the most. Neither would a comparison of the limits within which 50 % of the cities lie give a valid standard. Thus it would be manifestly illogical to conclude, since the average percentile expenditures for schools vary from 6% to 46 % (Table 4(*e*)), a spread of 41 %, and since the average percentile expenditures for street lighting vary from 1% to 11 % (Table 4(*d*)), a spread of 11 %, that, therefore, the expenditures for schools are nearly four times (41:11) as variable as those for street lighting. In the same manner would the fallacy of measuring the relative variability of expenditures by ratio of the P. E.'s appear. By the reduction of all the variabilities to a common unit of measurement, it is possible to place the expenditures for each item on a comparable basis as far as the quality of the variation is concerned. Developed according to the probably best formula[1] these coefficients of variability are given in the fourth column of Table 6. It will be noticed that each item retains, in its tendency to vary, in each year, an almost identical position with reference to the other items.

TABLE NO. 6

Table of medians, average deviations, standard deviations, and coefficients of variability. Percentile expenditures for maintenance and operation. Fiscal years 1900 and 1901. All cities in United States above 30,000 population

	Median.		Average Deviation.		Standard Deviation.		Coefficient of Variability.	
	1900	1901	1900	1901	1900	1901	1900	1901
Police Department..	8.02	8.28	2.17	2.30	2.96	2.59	.767	.799
Police Department, Courts, Jails, etc..	8.82	8.88	2.49	2.37	3.37	3.20	.839	.795
Fire Department....	8.23	8.46	1.99	1.80	2.45	2.28	.693	.619
Health Department .	.93	1.07	.56	.79	.91	1.40	.583	.768
Schools.....	23.60	24.96	6.39	6.30	8.09	7.56	1.32	1.06
Libraries, etc.....	1.02	1.02	.48	.44	.58	.55	.483	.442
Parks.....	1.04	1.04	.84	.80	1.16	1.06	.82	.784
Street Lighting.....	5.51	5.56	1.69	1.65	2.15	2.10	.719	.696

Relationship of the Variabilities.—If the different sections of Table 5 were examined carefully, or even better, if the tables of

[1] $V=\frac{A.D.}{\sqrt{Median}}$. See Thorndike, E. L., *Mental and Social Measurements*, pp. 98 to 102, especially p. 102.

the deviations of the percentile expenditures for schools from the median expenditure were compared, city by city, with the deviations from the median expenditure in another item, as, for instance, libraries and museums, it would frequently be found that a plus deviation in one item would be accompanied by a plus deviation in the other item and, *vice versa*, a minus deviation in one item would be accompanied by a minus deviation in the other. This quality of likeness would by no means *always* be found. But it *frequently* would. On the other hand, such a comparison with other items might reveal a degree of unlikeness; with still other items the relationships might seem to be in a state of neutrality or confusion.

At this point, some statistical manipulation which would permit these positive, negative, or neutral relationships to be expressed in some significant manner would be of inestimable service. If there is a positive relationship between the percentile expenditures for schools and the percentile expenditures for street lighting, or libraries, or parks, or any other of the items for which we have definite information, the knowledge of the fact would have practical as well as scientific value. Negative or neutral relationships would likewise be of interest and value.

Through the utilization of the Pearson Coefficient of Correlation it is possible to give a definite expression to these relationships. The application of and results derived from the use of the Pearson Coefficient will be developed and treated at length in Section VIII.

VII. Causes of Variability

There remains yet the open and legitimate question regarding the probable causes of the wide degree of variability exhibited by the percentile expenditures, for the various items enumerated. It is a veriest of commonplaces to repeat that cities, like individuals, would be expected to vary greatly in the amount and character of their expenditures. These variations have always been accepted as a concomitant fact of the differing needs and personalities of cities. In the following analysis an effort has been made to indicate and bring together some of those causes which may act as possible influences in the production

of variable expenditures—influences, too, which cannot be neglected in any consideration of public education in cities.

The variability of percentile expenditures, which has been observed, may be due to any one of eight general causes, or to combinations of these causes. These will now be taken up in the order of their supposed ascending influence upon the variability.

Influence of Population.—In accordance with the ordinary current notion regarding municipal affairs, there would seem to be some validity in the contention that the size of the city would be a predominating influence in the variability of such factors of municipal expenditure as are here treated. It might be held, with some show of reason, not only that the large city would necessarily have a larger relative expenditure for maintenance and operation than the small city, but also that the number of its needs would be greater; and as the number of its avenues of expenditure increased, the resulting tendency would be a diminution of the proportion of the public revenues available for each of the specified needs.

If the data upon which this work is constructed are fairly reliable, a distribution of the percentile expenditures for the various items, according to population classes, would disclose the degree of variability obtaining within these selected groups of cities. These distributions have been made for three items and are presented in Tables 7 (*a*), 7 (*b*) and 7 (*c*). From these tables, which are merely examples of all the distributions, it is very evident that no positive statement of the cause of variability, as depending upon population alone, can be made. The tendency toward a somewhat smaller range of variability, exhibited by the groups of larger cities in the tables, may be due to the smaller size of their groups, as compared with the groups of smaller cities, especially Group IV. *Very* large cities and *very* small cities may differ a great deal as to the quality and range of municipal and fiscal activity. In the main, however, the essential elements entering into the life of a city of 500,000 population differ but little from those of a city but one tenth as large. This particular point is an important one to keep in mind. Especially in educational administration is there a tendency to attempt to differentiate sharply between the conditions of the large and small city. In certain respects only is such a differentiation justifiable. The general conclusion appears to be, then, that

TABLE NO. 7

Tables of frequency. Percentile expenditures for maintenance and operation according to population groups.[1] *Fiscal years 1900 and 1901*

Per cent.	Group I (a) Schools		II		III		IV	
	1900	1901	1900	1901	1900	1901	1900	1901
6							1	1
7							1	0
8							0	0
9						1	0	0
10	1				1	0	1	1
11	1	1			0	0	0	0
12	0	0			1	1	0	1
13	1	2			0	0	1	0
14	1	0			1	1	0	0
15	2	1	1	1	0	0	1	0
16	1	0	1	1	0	0	1	1
17	3	2	2	2	1	0	4	2
18	1	3	1	0	4	0	1	3
19	1	4	1	0	0	2	1	3
20	1	1	0	2	3	5	3	2
21	2	2	2	2	4	2	3	4
22	0	0	1	1	3	2	2	2
23	2	0	0	2	1	4	4	1
24	0	0	0	0	5	1	1	2
25	1	1	3	2	2	0	2	3
26	0	1	2	1	1	3	1	1
27	0	0	0	1	1	1	2	5
28	0	0	1	0	2	4	3	4
29	0	0	0	0	0	3	1	2
30	0	0	0	0	1	2	2	2
31	1	0	0	0	2	1	1	1
32		0	1	1	2	0	1	1
33		0	1	1	1	2	1	2
34		0	0	0	0	0	5	4
35		0	0	1	0	1	4	2
36		1	0	0	0	1	2	2
37			1	0	1	0	1	1
38			0	0	0	1	1	1
39			0	0	1	0	2	1
40			0	0	1	1	0	0
41			0	1			0	0
42			0				0	1
43			0				0	1
44			0				0	1
45			0				1	0
46			0					1
47			0					
48			1					
No. of cities,	19	19	19	19	39	39	55	59
Median,	17.9	19.1	25.2	23.5	24.0	26.0	26.9	27.6

[1] The following basis for the selection of the groups of cities was used:
Group I.—All cities above 200,000 population.
Group II.—All cities from 100,000 to 200,000 population.
Group III.—All cities from 50,000 to 100,000 population.
Group IV.—All cities from 30,000 to 50,000 population.

TABLE NO. 7 (*Continued*)

Tables of frequency. Percentile expenditures for maintenance and operation according to population groups. Fiscal year of 1901

	(*b*) Fire Department.					(*c*) Police Department, Courts, Jails etc.			
Group	I	II	III	IV	Group	I	II	III	IV
Per cent.					Per cent.				
2				1	4				1
3				0	5			3	6
4	2		2	1	6	1	3	6	11
5	2		3	7	7	0	2	4	10
6	3	1	3	9	8	1	6	6	10
7	2	6	8	7	9	1	2	5	7
8	3	5	8	12	10	2	4	2	4
9	0	4	5	8	11	3	1	7	4
10	2	3	6	4	12	1	0	3	2
11	3		3	5	13	4	0	1	1
12	1		1	2	14	1	0	2	1
13	1		0	1	15	0	1	0	2
14			1	1	16	2		0	
15				1	17	1		0	
No. of	—	—	—	—	18	0		1	
cities,	19	19	40	59	19	1			
Median,	8.2	8.2	8.5	8.5	20	0			
					21	0			
					22	1			
					No. of	—	—	—	—
					cities,	19	19	40	59
					Median,	13.1	8.8	9.55	8.1

the size of the city apparently has but little influence upon the *variability* of the percentile expenditures for certain municipal activities.

Influence of Geographical Location.—At the best, the arbitrary segregation of cities into geographical groups for fiscal study must be unsatisfactory. The difficulties are much the same as with the division into population groups. *Some* eastern cities are markedly different from *some* central cities, and *some* central cities from *some* western cities. As groups of cities, eastern cities might not differ very much from central cities, nor central cities from western cities. The group of southern cities undoubtedly does reflect certain characteristics which have a tendency to place them in a class by themselves. This is notably the case as regards the support of education, where the situation is complicated by the traditional individualism and the difficult race problem. Table 8 gives the distribution of the percentile school expenditures according to arbitrarily made geographical

TABLE No. 8

Tables of frequency. Percentile expenditures for schools according to geographic groups. All cities in the United States above 30,000 population. Fiscal year 1901 [1]

Per cent.	Group I	II	III	IV	V
6			1		
7			1		
8			0		
9			0		
10			2		1
11		1	0		0
12		0	1		0
13		1	1		0
14		1	1		0
15	1	1	2		0
16	1	0	0	1	0
17	3	2	4	1	0
18	3	2	1	0	1
19	0	1	1	1	0
20	3	1	1	0	2
21	6	3	0	2	0
22	0	3	1	1	1
23	2	2	0	3	0
24	2	5	0	0	0
25	2	3	0	2	1
26	2	0	0	2	0
27	1	0	0	1	1
28	0	1	0	5	0
29	0	0	0	1	0
30	0	1	0	1	1
31	0	0	0	4	0
32	0	1	0	2	1
33	0	2	0	1	0
34	0	2	1	1	1
35	0	0		3	1
36	0	2		0	0
37	0	1		0	2
38	0	0		0	1
39	1	1		1	
40		0		1	
41		0			
42		0			
43		0			
44		0			
45		1			
46		0			
47		0			
48		1			
Total,	27	39	18	34	14
Median,	21.3	24.3	16.7	28.6	29.1

[1] The following is the basis for the selection of the groups:

Group I.—Cities of Maine, New Hampshire, Vermont, Connecticut, Massachusetts, and Rhode Island.

Group II.—Cities of New York, New Jersey, Pennsylvania, Maryland, West Virginia, Delaware, and District of Columbia.

Group III.—Cities of all southern states, including Texas.

Group IV.—Cities of Ohio, Indiana, Illinois, Michigan, Wisconsin, Minnesota, Iowa, and Missouri.

Group V.—Cities of all states west of Missouri River.

groups. As a whole the table is a demonstration of the predication of the small influence of geographical location upon the exhibited *variability* of expenditures. The only features worth noticing in passing are (a), the limited variability for the cities of the New England states, and (b), the generally low percentile expenditures in the southern cities. When it is recalled that these latter cities are credited with spending for education the money received from state and county, which in a number of cases is all that is spent, this low percentage is significant.

Influence of Municipal Environment.—The environment of a city as contrasted with its mere geographical location may be a factor of no mean influence in determining the quality and range of its expenditures. A thriving seaport, a mining community, or a large railroad centre, might require a much larger relative expenditure for police protection than a city developed as a residence district. Northern and southern cities might differ greatly in their respective expenditures for education merely on account of the item of fuel for school buildings. A city built in a congested manner would reasonably require a greater expenditure for fire protection than one of similar size, yet of much greater area. Proximity to natural sources of power (water and natural gas) might exert a decided influence in many items of municipal expenditure. The character of the natural drainage might easily serve as a deciding factor in the expenditure for health protection necessary in any city. These and many similar influences must be conceived as important factors in the discussion of causal relations of municipal fiscal policy.

Influence of the Mode of Classification of Public Accounts and of Systems of Accounting.—The modes of classification of public accounts and of the systems of accounting pursued by the fiscal authorities of different cities are most important factors in determining the possible character of the variability, within the group of cities, of the expenditures for any item. They are, in a sense, *secondary* factors in that they may not exert directly any important influence upon the *amount* of the expenditures of a city, although it is possible for them to do so. They are, however, the medium through which must be gained whatever exact knowledge we may have of the fiscal operations of the city. This is not the place to enter upon a technical discussion of the theory underlying a rational classification of municipal revenues

and expenditures,[1] or to lay stress upon the increased administrative efficiency arising from some uniform system of municipal accounting.[2] It will be sufficient to indicate in a concrete manner the possible influence of the lack of uniformity in classification and accounting upon the data with which this study is concerned.

The absence of any sharp distinction between "expenditures for construction and capital outlay" and "expenditures for maintenance and operation" might cause chance variations in the amounts charged for the maintenance and operation of particular departments. Between the itemized expenditures for maintenance and operation of a group of cities, in the absence of any uniform system, a certain amount of variability would very likely be caused. Expenditures made in any particular direction and charged to a particular department in one city might, in another city, be charged to an entirely different department. For example, some one ex-

[1] Clow, F. R., *A Comparative Study for the Administration of City Finances in the United States with Special Reference to the Budget, Publications of American Economic Association*, Ser. 3, vol. 2, No. 4 (1901), pp. 667–914; Gardner, Henry B., *Municipal Finance in the Twelfth Census, Publications of American Economic Association*, New Ser. (1899), vol. 2, pp. 418–465. Both of these studies contain interesting and valuable observations upon present fiscal practices of American cities.

Circular of the Division of Wealth, Debt, and Taxation of the United States. Instructions to Clerks and Special Agents for the Collection of Statistics of Municipal Finance. Bureau of the Census (July, 1904).

[2] The most influential movement in this particular has been inaugurated by the National Municipal League, through the appointment in 1901 of a "Committee on Uniform Municipal Accounting and Statistics." Reports of this committee, made by its chairman, Dr. Edward M. Hartwell, are to be found in the *Proceedings of the National Municipal League* and form a valuable contribution to this important element of municipal efficiency and economy. The following reports of the committee, and other papers bearing upon the topic, are especially pertinent:

Hartwell, Edward M., Chairman, *Report of the Committee on Uniform Municipal Accounting. Proceedings National Municipal League*, 1903 and 1904.

Powers, L. G., *Uniform Accounting in its Relation to Comparative Municipal Statistics. Proceedings of National Municipal League*, 1904, pp. 230–241.

Cleveland, F. A., *What Constitutes Reasonable Uniformity in Municipal Accounts and Reports. Proceedings National Municipal League*, 1904, pp. 203–215.

penditure which in city A would be designated as an expense for police service might, in city B, be charged to the department of public health, and in city C, to the street department. The use of service transfers [1] and the duplication of accounts further tend to shrink or expand the expenditures of the departments in different cities. This tendency to the intermingling of classification and of accounts would certainly, in the case of the definite comparison of two or any small number of cities, render the statistics derived from these classifications and accounts invalid for any exact conclusions. However, as this intermingling is purely a matter of chance, and as long as these "errors" of classification and accounting are not of a constant variety, they will, in the large group of cities under consideration, be rendered less potent in affecting the results. This does not, of course, mean that absolute or approximate uniformity of conducting fiscal operations is not a most desirable and necessary aim to be attained for the purpose of comparative statistics. *A chance error is not equal to no error at all; neither is it equivalent to a constant error.*

These elements, though, are not the only ones tending to complicate the nature of our data and to influence the variability of the itemized expenditures. In the original tables the expenditures for various municipal undertakings, such as water works, gas works, electric light works, docks and wharves, markets, cemeteries, etc., are included in the total expenditures for maintenance and operation.[2] Now in reality these enterprises generally are made self-supporting, or nearly so, by the revenues derived from the sale of the commodities produced or the privileges granted; hence, to include the expenditures for these departments as constituent portions of the expenditures for the maintenance and operation of the municipality is, in a sense, an unscientific procedure. Inasmuch as 80 % of the cities have been reported as having expenditures of this kind, and inasmuch as, in general, the amounts concerned are small, when reduced to per cents. of the gross total, their influence is minimized.

[1] Service transfers are transactions between two departments, offices, or accounts of a city in which one performs some service for another and receives pay or credit therefor.

[2] Excluded from the statistics for 1902 and 1903. See Sections X and XI, pp. 67 ff.

The item "interest on debt" is a confusing one. In most American cities, with the constant increase of the bonded debt, it is becoming of more importance each year. The amount of this element causes its definite localization in the system of classification of municipal expenditures to be of prime significance. Even of more import is its differentiation into amounts chargeable to the various municipal activities.

Economists and fiscal experts are not of one opinion regarding its exact position in the system of fiscal classification. However this may be, in this study the whole amount of interest paid on debt has been treated as properly belonging to the ordinary expenditures for maintenance and operation.

As to differentiation, the problem assumes a more difficult aspect. A bonded debt is generally incurred for a definite purpose—water, streets, schools, etc. The interest on this debt then very properly belongs as a charge against the department or purpose for which the debt was created.[1] Systems of municipal accounting have not as yet made provisions for such a logical division of payments; hence, ordinarily the interest payment is regarded as a separate item. For the most part, and in the majority of cities, bonded debt has been incurred through three principal branches of municipal activity—streets, water, and schools. In the present study, the only one of these entering into the conclusions is schools. To have included the interest on the school debt as a portion of the expenditures for the maintenance and operation of schools would have tended to increase the amount of these expenditures, and hence, also, *probably* to increase the size of the correlations developed between the expenditures for education and expenditures for other activities.

Without doubt, some of the variability exhibited by the expenditures for education in the different cities is due to the inclusion or exclusion of the amount of interest paid upon the

[1] It is pertinent to note here that the report of the Committee of the National Educational Association on Uniform Financial Reports (*Proceedings National Educational Association*, 1897, pp. 344–352) *excludes* the interest on debt as an item of current expenditure entering into the cost of education. The argument for this exclusion (p. 348) seems to be of a specious nature, economically considered. On the other hand, the schedules of the United States Commissioner of Education, prepared for the reporting of expenditures for public education in cities, *include* the item of interest on debt among current and incidental expenses.

bonded debt for schools. The inclusion would, unless a careful discrimination had been exercised in collecting the statistics, have taken place most likely in the case of those cities whose public school corporations possess administrative and financial autonomy. The influence of this inclusion is a chance one and may temporarily be disregarded.

Properly speaking, the entire gross amount of the expenditures for municipal maintenance and operation should also be differentiated into amounts chargeable to certain definite or special departments. If this were accomplished, there would be no "other" or "miscellaneous" expenditures, which too frequently merely acts as a reservoir for lassitude, incompetence, or carelessness in the conduct of financial operations.[1] At least, the item could be made to serve as a restriction to over-classification and not act in the way it does now, as a hindrance to the obtaining of a clear notion of the actual cost of maintaining important branches of the municipal governmental machinery.[2] What do we know, for example, concerning the cost of maintaining the various general administrative departments of cities, of the cost of the collection of taxes, etc.? In the present case there may be, in some instances concealed within the item of "other" expenditures, amounts properly belonging to definite departments. Any errors arising from such wrong inclusion are unavoidable; but as they are of a purely chance nature their influence upon the conclusions regarding the entire group will probably not be large.

Influence of State Subsidies for Education.—That the amount of money received by cities from other jurisdictions—state or county—for the support of specified activities may exercise some influence upon the variability of expenditures in different cities has, in the past, been accepted without question. The exact character of this influence, whether positive, negative, or neutral, has not been determined in any conclusive manner. As this subsidizing is most general in the case of education, the extent of this influence may be considered of some moment in

[1] See Table 9, in which are distributed the cities according to the percentile amount of undifferentiated expenditures.

[2] In the statistics for 1902 and 1903, subjected to study in Sections X. and XI., the item for "miscellaneous" and "other expenditures" has been practically eliminated.

this investigation. To what degree is this plan of granting subsidies conducive to a corresponding proportional increase in the expenditure of funds derived from purely local sources?

TABLE NO. 9

Tables of frequency. Unclassified percentile expenditures for maintenance and operation. All cities in the United States above 30,000 population. Fiscal years 1900 and 1901

Per cent.	1900		1901
1	1		1
2	2		0
3	1		0
4	1		1
5	0		0
6	1		6
7	8		6
8	5		10
9	5		12
10	15		18
11	13		11
12	8		10
13	5		9
14	5		5
15	8		4
16	5		11
17	7		9
18	6		5
19	7		1
20	8		0
21	1		1
22	2		5
23	2		3
24	3		3
25	0		0
26	0		2
27	0		0
28	0		0
29	1		0
30	5		0
31	1		0
32	1		1
33	2		0
34	0		0
35	3		1
one case at 48	1	one case at 43 one case at 44	2
	Total, 133		137

Unfortunately, no reliable data exists relative to the ratio of state and local support of education in cities.[1] Neither is such

[1] What might be comprehensive and reliable sources of such data, viz., the reports of the United States Commissioner of Education, are most untrustworthy in this respect.

information readily obtainable for any large number of cities. The whole question can best be solved by eliminating from the present consideration the possible positive or negative effect of the state subsidy. Consequently, all the expenditures for education within any city, irrespective of the sources of the revenues from which such expenditures are made, have been treated on the same plane. For in spite of other influences, which may be exercised by the state subsidy, from a purely fiscal standpoint, every city soon begins to regard the income from state or county in the same light as that derived from local sources. If the state subsidy be too large it may decrease the local feeling of financial responsibility to a point far below that necessary for the complete social efficiency of public education. If the state subsidy be inappreciable, or nothing at all, local responsibility may be stimulated to a very high degree. At least, such is the working principle of the current state subsidies. At any rate, from a statistical point of view, the raising of the question here points to an unsolved problem in educational administration. The present day practices founded on the principle of the equalization of educational opportunity between the communities within any state may in reality be unjust and operate in a direction contrary to that anticipated.[1]

Influence of Distribution of Functions.—The form in which the several governmental functions are distributed and controlled will act as an important influence upon the variability of expenditures. Properly to describe this form necessitates replies to three questions.

(a) How far does the state, or county, or other civic authority, assume direct responsibility for the support of specific functions? For example, courts, care of defective, delinquent, and criminal classes, public education, parks, water supply? In some states, the state or county bears all or part of the expense of the support of such activities in the cities; in others, the cities themselves must directly assume these expenditures.

(b) How far do the citizens of any community, in an indi-

[1] An investigation pointing to the truth of this statement has been conducted by Professor Ellwood P. Cubberley, of Leland Stanford Junior University. See *General taxation for education and the apportionment of school funds.* Teachers College, Columbia University, Contributions to Education, No. 2.

vidual capacity, pay for the performance of functions which would be assumed by the municipal government in another locality? For example, removal of garbage, sprinkling and lighting of streets, public education, public libraries and parks, police service, etc.?

(c) How far have the cities in question been granted the authority or assumed the responsibility for the performance of those functions with which we are concerned? This of course is the result of the process of subtracting from those activities, which *might* be considered as falling within the scope of municipal control, those whose support *is* assumed by the state or retained by the private individual.

In any *one* to *one* comparisons of the expenditures of cities, the differentiation of function as between the municipality and other civil jurisdictions on the one hand, and between the municipality and private assumption on the other, must receive due consideration in the derivation of any valid conclusions.

There is also a necessity in such a study as this to give weight to the influence of this distribution of function. Too much importance must not however be attached to this influence. What is being attempted here is some view of the character and relationships of *municipal* fiscal activity. In just how far such character and relationships reflect administrative and civic efficiency is a somewhat different problem.

Influence of Economic Wealth of Municipalities.[1]—The wealth of any city may rightfully be supposed to be the largest factor in determining the amount of money devoted to public purposes. Other things being equal, the rich city has a proportionately greater potential source of income for public purposes than the poorer city, and thereby is enabled to extend and multiply its activities in a manner best calculated to satisfy its local needs. It is able to do much with comparative ease, while the poor city must make many sacrifices to accomplish even less. As has been indicated in an earlier section, the influence of the wealth of the community has been partially eliminated owing to the reduction to a percentile basis of the factors of determination. We are

[1] See Harris, W. T., *Some of the Conditions which Cause Variation in the Rate of School Expenditures in Different Localities, Proc. Dept. of Superintendence, National Educational Association,* 1905, pp. 45–63, for some of the broader aspects of this particular topic.

measuring according to a relative rather than an absolute standard.

Nevertheless, this element of superior resources is one which should enter into any complete discussion of the extent of the development of the various municipal activities. In a later section an attempt has been made to trace some connection between educational expenditures and the taxable wealth of the community.

Influence of Methods of Revenue and Expenditure Administration.—The influence of the revenue and expenditure methods upon the variability of expenditures is a complex one. The modes of taxation, the limitation by the states of the rate of taxation for general or special purposes, the isolation of special forms of revenue for special purposes (excise tax for schools), the exercise of more than one local tax authority over the same territorial jurisdiction (as is frequently the case with local school revenues), are some of the causes on the side of revenue likely to produce a wide variation in the expenditures for any particular item. The control of expenditures, whether by some centralized body or by a series of more or less independent boards having fiscal authority over certain departments, presents another class of variability producing influences which are intimately bound up with the prevailing political and administrative systems.

Influence of Municipal Personality and Ideals.—The previously enumerated influences likely to produce, either acting singly or in combination, the observed variation in the percentage of municipal expenditures devoted to definite purposes are, with the possible exception of the secondarily acting influence of methods of accounting, those largely without the direct and immediate control of cities themselves. A city does not determine its location; its population and its wealth expand or shrink from forces rarely subject to definite direction; the authority of the state, through administrative control or limitation of fiscal activity, is exercised in an arbitrary manner. Is there not some sphere in which the city acts in a self-determining manner as regards the particular aspects of its activity here being discussed? Lacking somewhat perhaps in definiteness, it is put forth at this point as a predication, that the greatest influences upon the variability are the intangible personality and ideals of the city. In these two words may be concentrated the probable

effects of all of the other influences. It cannot be maintained that, *as* is the location, population, kind of state supervision, method of taxation, or manner of administrative direction, *so* is the city. Neither, perhaps, could the contention be upheld that, *as* a city spends its money, *so* is the city. It might be said with greater chance of ready acceptance, that, *as* are the citizens *so* is the city. However, the happiness, contentment, civic capacity, and ethical standards of a community are not capable of measurement, beyond that by the use of varying subjective standards. It may be possible, though, to obtain, through such an objective standard as the character of its expenditures, some index of the personality and ideals of its people.

A municipality is seldom economical in the expenditure of its revenues. It is far more often either parsimonious or extravagant. The recognition of the principle of expediency is much more frequent than that of real worth, or of final utility. The cost of public service is doubled because of the price often paid to mediocrity, or on account of the tribute levied under a system of political feudalism. And this price is paid by reason of civic inertia and impotence, or because the standards of good service are not known. The social income is spent according to standards that *were* or *are*, and not according to standards that *ought to be*. A city is not a machine, and any description of the forces that make for progress or otherwise must keep in mind that human beings make up, and human minds direct, municipal affairs and set up civic standards. The final aim of the study will be to gain some insight into the personality and ideals of the American municipality as these are revealed to us through some of the aspects and relationships of its fiscal activity. For it is here perhaps that the character of this personality and of these ideals is best exhibited.

Conclusion.—The phenomenon of variability is a constant one, if cities are subject to the law that governs all other social institutions. This variability may be due, as we have seen, to a large number of causes.[1] Before attempting to analyze the connection which may exist between the causes and the variabilities, some of the more important relationships of these variabilities will be pointed out.

[1] There may be other minor causes leading to this variability. I have stated what seem to me to be the ones most likely to be influential.

VIII. Relationships between Items of Expenditure

Implications of the Variability.—In the previous discussion [1] concerning variability, the question was raised as to the probable relationships which might exist between the various items of expenditure. Do the cities that spend a larger proportion than is ordinary of their total expenditures for the maintenance and operation of public schools also spend a larger proportion than is ordinary for libraries, for street lighting, for police service, for protection of health, etc.? Or does a proportional large expenditure for education mean that this is accomplished at a sacrifice of the support of such other activities? In other words, does proportional generous support of education convey any information concerning the character of the municipality regarded as a whole? If the existence of certain relationships can be demonstrated, then in general, a new basis of municipal worth and efficiency might be established.

The Pearson Coefficient of Correlation.—It will be recalled that a brief mention was made in the preceding section [2] of the use of the Pearson Coefficient of Correlation as a method of measurement for determining the exact nature of these relationships. Divested of its mathematical terminology this coefficient is a measure of the general relation of a deviation of the amount of one item of expenditure in a city from the typical amount of that item (*i. e.*, median, mode, or average), to the deviation exhibited by the same city of the amount of some other item of expenditure. A mere comparison of the variabilities of two items of expenditure within a group of cities might enable one to infer the existence of a relationship, especially if the relationship were a strong one and the tables did not contain so many cases as to preclude ready inspection and comparison. No amount of such inspection and *one to one* comparison, as has been suggested, would enable one to give a definite value to the relationship.

The Pearson Coefficient [3] is the agency by which we attain

[1] Pp. 40–41. [2] P. 41

[3] The following references to the Pearson Coefficient of Correlation are given: Pearson, Karl, *Grammar of Science*, chapter on Correlation; Thorndike, E. L., *Educational Psychology*, pp. 26 *ff.*; Thorndike, E. L., *Theory of Mental and Social Measurements*, pp. 121 *ff.*; Spearman, C., *The Proof and Measurement of Association between Two Things*, *American Journal of Psychology*, XV., 1904, pp. 72–101.

this expression of exactness. This *Coefficient of Correlation* is a figure so calculated from individual records as to give the degree of relationship between two items which will best account for all the separate cases in the group. In other words, it expresses the degree of relationship from which the actual cases might have arisen with least improbability. It has possible values from + 100 %, through zero, to − 100 %. That is to say, in the present situation, a coefficient of correlation of 100 % between any two items of expenditure, such as *schools* and *street lighting*, would posit that the city which spent the largest proportion of its total expenditures for maintenance and operation of education, also spent the largest proportion for street lighting; and that, if the cities were ranked in order according to the proportion spent for education, and then in the order according to the proportion spent for street lighting, the two rankings would be identical; that the position of any city with reference to the others in one item of expenditure would be the same for the other item (both being reduced to terms of the variabilities of the percentile expenditures as units to allow comparison). On the contrary, a coefficient of − 100 per cent. between *schools* and *street lighting* would mean that the city which spent the largest proportion for education spent the lowest proportion for street lighting; that the *best* city in our percentile ranking in education would be the *lowest* in the percentile ranking for street lighting. A coefficient of + 62 % would mean that (comparison being rendered fair here, as always, by reduction to the variabilities as units) any given station for one item would, on the whole, imply 62 hundredths of that station for the other. A coefficient of − 62 % would, of course, mean that any position above the central tendency for one item would, on the whole, mean a position below the central tendency for the other item equal to 62 hundredths of the amount the first was above the central tendency.[1]

Existing Relationships.—Table 10 presents the coefficients of correlation between certain items as they have been found to exist by use of the Pearson formula. The three columns give the amount of the coefficients for the two different years, and those derived from the average of these two years.

[1] This explanation has been adapted largely from Thorndike's *Educational Psychology*, p. 26.

TABLE NO. 10

Table of Pearson coefficients of correlation. Percentile expenditures for maintenance and operation for the fiscal years 1900 and 1901. All cities in the United States above 30,000 population

	1900	1901	Average of 1900 and 1901
Schools with—			
Police Department	+.0256	−.149	−.069
Police Department, Courts, etc.	−.0459	−.15	−.0679
Fire Department	+.203	+.065	+.0969
Health	−.0243	−.205	−.0145
Libraries and Museums	+.279	+.315	+.293
Parks	+.031	+.065	+.0156
Street Lighting	+.354	+.336	+.344
Interest on Debt			−.482
Other Expenditures			−.288
Street Lighting Department with Police Department			+.0685
Fire Department with Police Department, Courts, etc.			+.139

These particular items of expenditure were selected from the other items because there is, in all probability, less likelihood of variation and inequalities arising with them from confusion of accounts. While this element is not an entirely negligible quantity and perhaps never will be as long as there are differences in men and cities, it is assumed that the data collected and presented in our original tables reflect the approximately true nature of these particular expenditures in American cities.

Significance of Relationships.—Remembering the possibility of a Pearson coefficient varying in value from plus 1.00 through zero to minus 1.00, the small size of the coefficients in Table 10 [1] may appear to be without significance. That is, a coefficient of −.067 for police department, courts, jails, etc., may be without any readily ascertained meaning. It must, however, be kept in mind that a large percentile expenditure in any one direction leaves a correspondingly *less* amount to be distributed among the other activities. Hence, the plus correlations between schools and the four items indicated in Table 10, viz., fire,

[1] Throughout this explanation and interpretation the coefficients referred to are always the average coefficients for the two years' expenditures. The average figure is self-evidently a more reliable one.

libraries and museums, parks and street lighting, are demonstrations of certain tendencies of a significant nature. They indicate that there are some activities which bear a definite fiscal relation to each other, and these relationships undoubtedly reflect certain more or less constant characteristics of municipal expenditures.

The large positive correlation between the support accorded to public education and that accorded to libraries is what might be inferred. A generous attitude toward each is largely the result of the existence of the same cultural forces operative in any community producing certain municipal ideals.

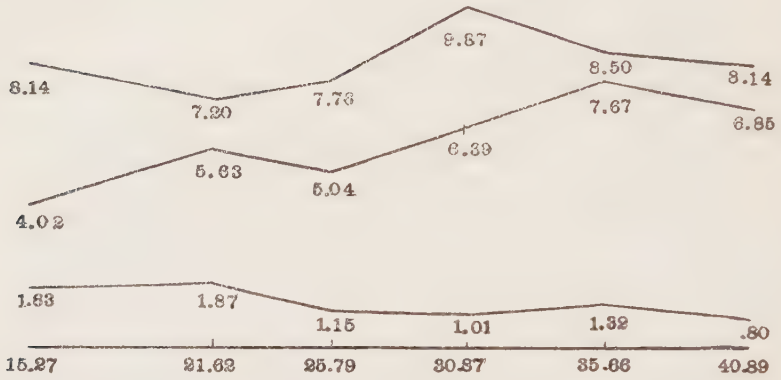
In a like manner, the positive coefficient of correlation between expenditures for schools and those for street lighting is indicative of similar forces at work. It is here recognized that the *cost* of street lighting may bear no direct proportional relation to the *amount* of lighting done, inasmuch as the cost is subject to a variety of influences, such as compactness of the community, wise or unwise contracts with private lighting companies, the proximity of the city to sources of natural power, etc. Having in mind these restrictions, it is still permissible to conclude that, in general, the city which is willing and able to give more than the ordinary (median) percentage of its total expenditures for public education, is also willing to give considerably more than the median amount to the lighting of its streets.

The large minus correlation between schools and interest on debt is significant and worthy of special attention by those who see danger in the marked tendency of American cities to increase their bonded obligations to the legal maximum.

The remaining correlations with schools, while small, are indicative of relations of an interesting nature. Apparently there is an inclination of cities to appropriate somewhat less than the normal proportion of their expenditures for police and health protection and slightly more than the normal for fire protection and parks as their educational expenditures rise above the normal percentile amount.

To be of the most value, the expenditures for each municipal department should be correlated with those for every other department. Especially should the relations between school expenditures and the expenditures for all other chief municipal departments be evaluated. The relation which the cost of

FIG. 11.



Explanation of Figure 11.—The diagram relates to the average percentile expenditures for 1900 and 1901, for the items indicated, in the 55 cities possessing a population of 30,000 to 50,000, according to the census of 1900. The numbers on the diagram were derived as follows: The 55 cities were arranged in the order of their *ascending* percentile expenditures for public schools. Thus arranged, they were then divided into six groups, each of the first five groups having ten cities, and the sixth group having five cities. The *averages* of the percentile expenditure for two years for each of the indicated items were then calculated, and the following results obtained.

Average Percentile Expenditures for

	Public Schools	Fire Department	Street Lighting	Health Department.
Group 1	15.27	8.14	4.02 (9)[1]	1.63 (7)[1]
" 2	21.62	7.20	5.63 (9)[1]	1.87
" 3	25.79	7.76	5.04	1.15
" 4	30.87	9.87	6.39	1.01
" 5	35.66	8.50	7.67	1.32
" 6	40.89	8.14	6.85	.80

Hence, if the expenditures for public schools be represented, according to scale, on a horizontal line, the general relation of the expenditures for each of the other items may be shown by a broken line, drawn to a scale, in accordance with the direction of the deviation of expenditures for the specified group of cities.

[1] Figures in parentheses indicate number of cities for which data were available.

general administration bears to that of educational administration and supervision; the relation of the cost of the various elements that enter into the maintenance of streets; these and many other salient and evident interdependencies must be determined before we shall be able to reach any absolute conclusions regarding the proportion of the social income which should be devoted to this or that essential purpose. Once determined, these relations may afford certain standards which would remove the more important items of expenditure at least from the realm of mere expediency. The complete set of these correlations would give a clear insight into the fiscal and perhaps the sociological characteristics of the American city. Until we have, however, better means by which to differentiate more sharply between the various items of expenditure, such work will be impossible; yet its accomplishment is a very necessary complement to that of establishing the very much needed standards for municipal and educational fiscal policies.

In Figure No. 11 (p. 60) an attempt has been made to give a diagrammatic representation of the character of the relationships expressed by the Pearson coefficients.

IX. Variability and Correlation of Per Capita Expenditures

It has been thought both advisable and necessary for any adequate treatment of the present phase of the fiscal position of education in cities to develop and point out relationships upon other than the basis of percentile expenditures.

Data.—For the following portion of the study the same general data were utilized as in the preceding sections. The tables of *per capita* expenditures [1] for the maintenance and operation of certain municipal departments as published in the Bulletins of the Department of Labor for 1901 and 1902 were selected as the chief basis.

Variability of Per Capita Expenditures.—An inspection of

[1] These tables were derived by dividing the expenditures for the various items by the figure representing the population: according to the official census of 1900, for the expenditures given for 1900, and according to the estimated population of January 1, 1902, for those of 1901. For a criticism of this last procedure, see *Proceedings of National Municipal League*, 1904, p. 253.

Tables 11 and 12 discloses the same wide variability in the per capita expenditures for the various items as was pointed out in the case of the percentile expenditures. The evidence afforded by this range of per capita variabilities is here adduced to lend force to the conclusions arrived at from the study of the variabilities of the percentile expenditures.

The wide range of the total per capita expenditures as displayed by Table 11(*e*) is an index of the extreme variability of municipal fiscal operations. That this variability is not produced alone by the commonly supposed increased cost of maintenance and operation as the cities increase in population and extent is confirmed by the evidence presented in Table 12.

TABLE NO. 11

Tables of frequency. Per capita expenditures for maintenance and operation. All cities in the United States above 30,000 population. Fiscal years 1900 and 1901

(*a*) Police Department, Police Courts, Jails, Workhouses, Reformatories, etc.			(*b*) Fire Department.		
Expenditure.	Frequency. 1900	Frequency. 1901	Expenditure.	Frequency. 1900	Frequency. 1901
$ .30	0	2	$ .20	1	1
.40	4	4	.30	3	3
.50	6	5	.40	5	4
.60	6	8	.50	4	5
.70	15	12	.60	8	11
.80	11	13	.70	11	11
.90	21	15	.80	16	13
1.00	8	20	.90	18	19
1.10	10	9	1.00	10	13
1.20	9	10	1.10	12	15
1.30	8	7	1.20	11	12
1.40	5	5	1.30	10	8
1.50	4	4	1.40	6	6
1.60	5	2	1.50	6	7
1.70	1	3	1.60	1	2
1.80	3	3	1.70	3	0
1.90	3	3	1.80	3	4
2.00	2	1	1.90	3	1
2.10	4	4	2.00	0	0
2.20	1	1	2.10	1	0
2.30	1	0	2.20		1
2.40	0	0			
2.50	0	0	Total,	132	136
2.60	1	0			
2.70	0	1			
2.80	0	0			
2.90	3	0			
3.00	0	0			
3.10	0	1			
3.20	0	2			
3.30	0	1			
3.40	0				
3.50	1				
Total,	132	136			

TABLE NO. 11 (*Continued*)

Tables of frequency. Per capita expenditures for maintenance and operation. All cities in the United States above 30,000 population. Fiscal years 1900 and 1901

(c) Schools. Expenditure.	Frequency. 1900	Frequency. 1901	(d) Street Lighting. Expenditure.	Frequency. 1900	Frequency. 1901	(e) Total. Expenditure.	Frequency. 1900	Frequency. 1901
$ .80	1	0	$ .10	2	0	$ 4	1	1
1.00	1	5	.20	6	5	5	3	2
1.20	3	2	.30	3	4	6	4	4
1.40	3	5	.40	14	21	7	6	10
1.60	1	1	.50	17	15	8	9	15
1.80	5	4	.60	21	19	9	15	10
2.00	8	9	.70	20	26	10	13	22
2.20	6	9	.80	13	10	11	14	3
2.40	11	10	.90	13	12	12	10	12
2.60	17	8	1.00	6	8	13	7	13
2.80	9	16	1.10	4	2	14	8	10
3.00	9	9	1.20	2	0	15	9	8
3.20	9	14	1.30	1	1	16	8	10
3.40	14	14	1.40	0	1	17	5	5
3.60	15	4	1.50	1	1	18	6	3
3.80	2	5	1.60	0	1	19	3	0
4.00	6	6	1.70	2	0	20	2	0
4.20	2	2				21	3	4
4.40	3	3	Total,	125	126	22	1	1
4.60	2	4				23	1	
4.80	0	1				24	0	
5.00	1	0				25	0	
5.20	2	1				26	0	
5.40	0	4				27	0	
5.60	1					28	0	
5.80	0					29	0	
6.00	1					30	1	
						31	2	
Total,	132	136				32	0	
						33	0	
						34	0	
						35	1	
						Total,	132	136

The probable causes of the variability of the municipal expenditures, discussed at length in Section VII, will be recalled here. Whatever may be the extent of the influence of any, or all, of the causes, it cannot be assumed that the municipality spending $4 per year in the maintenance and operation of its various departments represents the degree of municipal efficiency of one devoting $36 for these purposes; nor that municipal economy is recognized equally in cities spending $5 and $25 per inhabitant in fulfilling their municipal functions.

TABLE NO. 12

Tables of frequency. Total per capita expenditures for maintenance and operation according to population groups.[1] *All cities in the United States above 30,000 population. Fiscal years 1900 and 1901*

Groups—	I		II		III		IV	
	Frequency.		Frequency.		Frequency.		Frequency.	
	1900	1901	1900	1901	1900	1901	1900	1901
$ 4	0	0	1	0	0	0	0	1
5	0	0	0	0	0	0	3	2
6	0	0	1	0	1	0	3	4
7	0	0	0	1	0	2	6	7
8	0	0	1	2	4	5	4	8
9	0	0	1	1	5	4	9	6
10	0	0	0	2	7	10	6	10
11	2	0	3	1	5	2	3	0
12	2	4	1	2	4	3	3	3
13	1	1	2	4	2	5	2	4
14	2	6	3	0	3	2	0	1
15	3	1	2	2	0	1	5	4
16	1	3	0	0	1	1	5	6
17	1	0	1	0	1	4	2	1
18	2	2	0	0	2	0	2	1
19	2	0	0	4	1	0	0	0
20	1	0	0		1	0	0	0
21	0	0	2		1	0	0	0
22	0	0	1		0	1	0	0
23	0	0			1		0	0
24	0	0					0	0
25	0	0					0	0
26	0	0					0	0
27	0	0					0	0
28	0	1					0	1
29	0	0					0	
30	0	0					1	
31	2	0					0	
32		0					0	
33		0					0	
34		0					0	
35		0					1	
36		1						
Total,	19	19	19	19	39	40	55	59

Figures 12–16 represent diagrammatically the data assembled in the tables of frequency.

Pearson Coefficients for Per Capita Relationships.—It is, however, from the Pearson coefficients of correlation that we obtain a further notion of the relationships that exist between certain of the elements of municipal expenditures. The details of the explanation of the meaning of Table 13 need not be given here, as they are similar to those given in the general

[1] See Table No. 8, p. 45, for grouping of cities.

FIG. 12.

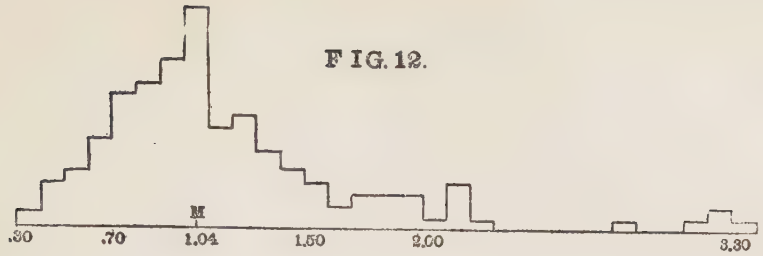


FIG. 13.

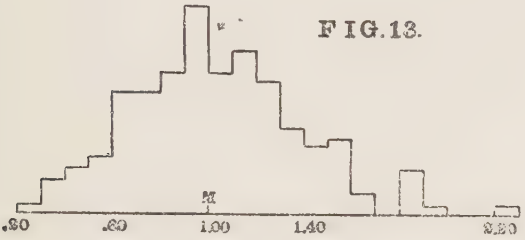


FIG. 14.

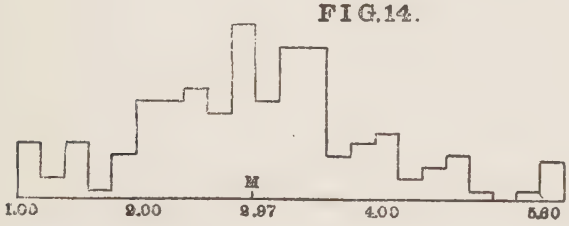


FIG. 15.

SURFACES OF FREQUENCY—PER CAPITA EXPENDITURES, 1901

Fig. 12.	Police Department, Courts, Jails, etc.	Median,	$1.04.
Fig. 13.	Fire Department.	Median,	1.00.
Fig. 14.	Schools.	Median,	2.97.
Fig. 15.	Street Lighting.	Median,	.69.

FIG.16.

SURFACES OF FREQUENCY—PER CAPITA EXPENDITURES, 1901

Fig. 16. Total for Municipal Maintenance and Operation. Median, $12.30.

explanation of the meaning of the Pearson coefficient and in the explanation of the percentile correlation. They signify on the whole that the cities spending above the median amount per capita on public education will spend only such an amount above the central tendency as is indicated by the degree of relationship expressed by the coefficient.

TABLE NO. 13

Table of Pearson coefficients of correlation. Per capita expenditures for maintenance and operation. All cities in the United States above 30,000 population. Fiscal years 1900 and 1901

Schools with—	1900	1901
Police Department, Courts, etc.	+.232	+.319
Fire Department	+.444	+.389
Street Lighting	+.333	+.361
Assessed Valuation of Real and Personal Property		+.45

The last correlation of those given in the preceding table, though somewhat uncertain in value, is indicative of one thing, namely, that while there is a decided tendency, on the part of those communities possessing a large amount of economic wealth subject to taxation, to spend a large per capita amount on education, these communities do not, in proportion to their increased wealth, spend a proportionately increased amount on education. Any accurate or valid conclusion regarding the influence of the amount of tax-producing property must include a consideration of the relation which the different sources of the

municipal income bear to one another. This would be especially necessary for all of those cities deriving any large amount of revenue from sources other than the general property tax. *Real* value of property as distinguished from *assessed* value would be a far better basis for a correlation figure which would give the relation between potential and actual support of the various municipal activities under a *régime* of general property taxation. The correlation is presented here not because it stands for any definite condition of things, but primarily to indicate the *possibility* of representing in a concrete manner the relation between the potential and the assumed responsibility of cities for the development and support of public education.

X. Supplementary Study of the Variability and Correlation of Municipal Expenditures [1]

Data of Municipal Expenditures for 1902 and 1903.—Under the title of *Payments for General and Municipal Service Expenses by Departments, Offices, and Objects*,[2] the Bureau of the Census has presented the data of the expenditures for maintenance and operation of the various municipal departments for the fiscal years 1902 and 1903, for the 163 cities of the United States possessing a population of 25,000 and over. For an extended exposition of the sources and character of this data reference is made to the introductory text, accompanying the statistics of cities. It is sufficient here to call attention to a few special features of the financial statistics which distinguish them from others of their kind, especially those presented in the reports of the Department of Labor, and which give to them a significant value for the present purpose. For the first time in the actual practice of gathering and presenting on a large scale municipal financial statistics, an effort has been made to differentiate the municipal activities and to adopt a terminology in harmony with the theory and principles of modern public finance. As far as this study is concerned the most important

[1] I desire at this time to make an acknowledgment of my deep obligation to Mr. L. G. Powers, Chief Statistician, Bureau of the Census, for his assistance in rendering accessible to me, before the distribution of the official report, the data upon which this portion of the study is founded.

[2] Table 21, *Bulletin* 20, Bureau of the Census (1905), pp. 204–293.

distinction made is that between *governmental* and *commercial* functions, a distinction long ago pointed out by writers upon public finance, yet one of somewhat tardy recognition by those engaged in gathering and presenting the financial statistics of cities.

> The term *governmental functions* . . . includes those municipal functions which are as a rule performed for all citizens alike without any attempt to measure the amount of the benefit conferred or exact compensation therefor. Most of them are essential to the existence and development of government and to the performance of the governmental duty of protecting life and property and of maintaining a high standard of social efficiency. Chief among such activities are those of general administration; the protection of life, health, and property; the care of the defective, delinquent, and dependent classes; the education of the young, and the performance of other duties of a similar nature; the purchase of lands for municipal buildings, parks, and streets; the erection, equipment, and management of city halls and other buildings for general municipal uses; and the purchase or construction and operation of gas and electric light works for the exclusive purpose of lighting the streets and the city buildings, and of other structures and plants—such as printing offices, police and fire telephone systems, and bridges—for furnishing free of charge any commodity or service required by the city in the common interest of all its citizens. In the same category are included the opening, grading, paving, and curbing of streets, and the construction of sewers, where such public improvements are made at public expense, without, in the opinion of the proper authorities, conferring upon particular individuals measurable special benefits, for which compensation is exacted by the city. To the same general group belong the making and paying of loans and the payment of interest thereon, when such loans are made in connection with the other activities and transactions before mentioned.
>
> . . . . . .
>
> The *commercial functions* of cities include those which create trade relations, industrial or semi-industrial, between the municipality and the general public, including other municipalities or civil divisions. Among the transactions which arise from the exercise of such functions are those involving the loan of public money at interest, the use of public property for compensation, the sale of any commodity or article of commerce, or the performance of any work or service for pay. All these transactions involve the performance by the city of some service or the grant of some favor for special compensation, whether such service is undertaken or favor granted primarily

for the service to be rendered or favor bestowed, or for the revenue to be secured. None of them is essential to the existence and development of the government, although they may be made to contribute to its support.

Commercial functions, together with commercial and semi-commercial transactions which arise from them, may be grouped into three subclasses, here designated as *municipal investments*, *municipal industries*, and *municipal services*.

(1) Under *municipal investments* are included all transactions of municipal governments connected with the purchase, sale, or possession of real property or securities held exclusively for investment purposes, and the loan of public money to individuals, corporations, or other civil divisions. Such transactions are of two classes: First, those of the sinking, investment, and public-trust funds in which or through which the city invests money for the sole purpose of deriving interest, rent, or other income therefrom. Second, the transactions of a more temporary character by which the city receives interest on current cash deposits and on deferred payments of taxes and special assessments.

(2) *Municipal industries* are those activities—such as municipal waterworks, gas and electric light works, and street railways—which are organized as more or less complete departments or offices of cities for the purpose of furnishing economic utilities to individual citizens on such terms as may be determined by considerations of public policy. These activities are generally referred to by British writers as *municipal trading*. They are also frequently called *quasi-private industries* or *enterprises*. As economists use the term, a *quasi-private* industry or enterprise of a municipality is one in which the purpose of realizing a net income or profit controls the method of management and determines the charges, as in a private business of similar character. In this strict sense of the term there are few, if any, *quasi-private* industries or enterprises in the United States, the greater number of municipal industries established in American cities having been called into existence principally or solely to promote the welfare of the citizens. Hence the Bureau of the Census uses the term *municipal industries* to include not merely those properly designated as *quasi-private*, as defined above, but all departments, offices, or activities organized by cities to furnish utilities to their citizens for a compensation but without regard to the question of profit.

(3) *Municipal services* include all activities and transactions, other than such as are included in (1) and (2), which are engaged in by cities or by any of their independent branches or departments in the interest of the general public, but which confer measurable special benefits—or what are arbitrarily so regarded—upon particular persons, natural or corporate, for

which compensation is exacted. These services include the opening of streets, the construction of pavements, sidewalks, and sewers, the sprinkling of streets, and similar services, the payments for which are enforced by means of special assessments. To the same category belong also all services or special benefits rendered to private individuals or to other civil divisions *under legal regulations*, and paid for by fees, charges, rents, privilege rentals, and kindred remuneration.[1]

In the statistics presented by the bulletins of the Department of Labor these distinctions were not made, hence all expenditures on account of municipal investments, industries, and services have been included in the same class as those incurred in the pursuit of the more generally recognized governmental functions.[2]

The second important character of these statistics for 1902 and 1903 is the scheme of classification of the expenses, outlays, and revenues of cities.[3] The so-called general expenses are those in the exercise of governmental functions. In the tables the general expenses are divided into the following classes: (1) General Administration (including expenses for mayor and executive offices, legislative offices, law offices and accounts, finance offices and accounts, elections, public printing, etc.); (2) Public Safety (including expenses for courts, police department, militia and armories, fire department, department of inspection, health department, etc.); (3) Public Charities and Corrections (including care of poor—in and outside of institutions—children in institutions, lodging houses, miscellaneous charities, hospitals, prisons and reformatories); (4) Public Highways and Sanitation (including expenses of street paving, lighting, sprinkling and cleaning, refuse disposal, sewers, etc.); (5) Public Education (including schools

[1] *Bulletin* 20, Bureau of the Census (1905), pp. 4–7.

[2] For instance, the city of New York is charged with an expenditure for the maintenance and operation of the water-works system for the year 1901 the sum of $3,000,990; for construction and other capital outlay on account of the water-works system, $3,450,780; yet the receipts of the water department during 1901 were $8,050,900. It is manifestly inaccurate to place these expenditures on account of the water works system in the same category as those for public education.

[3] See Introductory Statement, *Bulletin* 20, Bureau of the Census, (1905), for definitions and explanation.

and libraries); (6) Public Recreation (including expenses for parks, gardens, baths, public celebrations and entertainments); (7) Other General Expenditures; (8) Interest on Municipal Obligations. While it is not the purpose here to contest the economic or statistical validity of the method of classification followed in the presentation of these statistics by the Census Bureau, and there are certain points open to criticism, the above description of their general nature has been inserted here primarily to direct attention to their increased usefulness for comparative purposes over those previously gathered by the Department of Labor, inasmuch as they reflect more accurately than any former statistics the fiscal activity of American cities.

Selection of Cities for Study.—In this portion of the study it was deemed more expedient to make a somewhat narrower selection of cities than that followed previously. To this end the group of cities having a population of from 25,000 to 50,000 was taken. This selection was broad enough to give a representative group, inasmuch as of the 163 cities of the United States having in 1902 a population of 25,000 and over, 78, or a trifle less than 50 % of them, fell within the group chosen for study. At the same time this selection produced perhaps a somewhat greater homogeneity of conditions affecting municipal expenditures than that of the group of cities previously studied.

Preliminary Arrangement of Data.—By reason of the system of distributive grouping of expenditures employed by the Census Bureau, it was thought advisable for the present purpose to combine under a fairly small number of representative and comparable headings the payments recorded for general and municipal service expenses. Without interfering with the mode of differentiation of these payments as presented in the tables, the total payments for general and municipal service expenses were divided into seventeen classes, as follows:

1. Expenses for General Administration. Including expenses for all executive and legislative offices, law offices and accounts, finance offices and accounts, statistical and miscellaneous general offices, city hall, and elections.
2. Expenses for Courts.
3. Expenses for Police Department. Including expenses

Showing percentages of total payments for general and municipal service years 1902 and 1903. Cities between

	Cities.	General Administration.	Courts.	Police Department.	Militia.	Fire Department.	Health Department.
1	Schenectady, N. Y.	11.54	.67	11.87		9.22	1.40
2	Youngstown, Ohio	8.21	.05	13.41		9.92	2.56
3	Holyoke, Mass.	10.32	.13	7.18	.001	10.66	2.25
4	Fort Wayne, Ind.	6.83	.28	9.34		15.77	2.11
5	Akron, Ohio	6.64	.13	8.05	.09	17.00	1.04
6	Saginaw, Mich.	9.24	.67	8.54		7.27	.57
7	Tacoma, Wash.	6.45	.25	6.51		8.73	.82
8	Covington, Ky.	11.28	1.17	10.25		9.10	1.72
9	Lancaster, Pa.	7.77		1.08		7.69	.72
10	Dallas, Tex.	7.66	.49	9.90		11.02	.18
11	Lincoln, Nebr.	8.08	.35	4.69		8.71	.82
12	Brockton, Mass.	9.37		7.44	.32	9.20	1.59
13	Pawtucket, R. I.	8.86	.07	8.10		6.81	.63
14	Birmingham, Ala.	7.52	.69	12.32	.07	13.45	1.97
15	Little Rock, Ark.	12.08	.90	16.78		15.05	1.96
16	Spokane, Wash.	7.96	.42	5.35		10.27	1.18
17	Altoona, Pa.	8.93		5.36		9.01	.83
18	Augusta, Ga.						
19	Binghamton, N. Y.	8.69	1.19	7.62		6.79	1.28
20	Mobile, Ala.						
21	South Bend, Ind.	7.94	.32	9.49		13.88	.29
22	Wheeling, W. Va.	8.17	.12	11.22		13.47	1.47
23	Springfield, Ohio	7.88	.65	7.57		8.99	2.22
24	Johnstown, Pa.	6.10		8.85		5.89	1.53
25	Haverhill, Mass.	6.29		6.98	.19	9.98	.97
26	Topeka, Kan.	7.52	.37	6.76		11.52	2.23
27	Terre Haute, Ind.	6.37	.27	8.84		19.43	3.33
28	Allentown, Pa.	7.09		6.00		9.61	2.10
29	McKeesport, Pa.	9.90		11.18		10.30	3.34
30	Dubuque, Iowa	8.43	.01	8.20		10.08	.61
31	Butte, Mont.	9.15	.51	13.73		12.48	1.26
32	Davenport, Iowa	6.60	.36	7.34		13.52	.87
33	Quincy, Ill.	5.93	.37	8.03		15.55	.36
34	Salem, Mass.	7.18		8.62	.79	7.57	3.61
35	Elmira, N. Y.	11.35	1.21	8.18		12.90	1.92
36	Malden, Mass.	5.09		5.94	.11	5.68	2.11
37	Bayonne, N. J.	9.46	1.49	13.13	.11	2.99	.90
38	Superior, Wis.	13.53	.41	6.88		18.37	2.98
39	York, Pa.	6.53		8.65		9.85	1.05
40	Newton, Mass.	7.67		7.73	.05	5.14	.87
41	East St. Louis, Ill.	8.82	1.13	8.72		9.98	.87
42	Springfield, Ill.	8.55		11.75		15.48	.85
43	Chester, Pa.	9.24		9.30		7.10	5.22
44	Chelsea, Mass.	5.78		7.92	.06	6.94	1.69
45	Fitchburg, Mass.	6.37		8.31	.07	8.26	1.48
46	Knoxville, Tenn.	8.10		8.07		12.38	4.33
47	Rockford, Ill.	5.32	.26	7.00		12.07	.67
48	Sioux City, Iowa	8.08	.33	6.80		7.38	.84
49	Montgomery, Ala.	6.05	.42	13.07		8.10	3.05
50	Taunton, Mass.	6.90	.19	8.71	.19	6.22	1.90
51	Newcastle, Pa.	8.09	.08	6.75		10.75	.77
52	Passaic, N. J.	8.96	1.35	6.11	.10	8.29	1.36
53	Atlantic City, N. J.	7.96	.82	11.58	.01	14.25	1.67
54	Canton, Ohio	5.88		8.25		11.19	1.44
55	Jacksonville, Fla.						
56	Galveston, Tex.	8.54	.26	9.78		12.15	1.52
57	Auburn, N. Y.	9.38	1.15	7.01		10.52	.92
58	Racine, Wis.	6.24	1.03	4.13		14.14	1.19
59	South Omaha, Neb.	12.16	.89	7.12		9.52	1.21
60	Joplin, Mo.	8.84	.60	9.89		13.85	.92
61	Joliet, Ill.	6.92		10.29		9.49	1.98
62	Chattanooga, Tenn.	7.83	.57	12.19		15.72	3.02
63	Woonsocket R. I.	6.76	.06	8.24		8.35	1.79
64	Sacramento, Cal.	8.50	.85	8.90		9.66	1.12
65	La Crosse, Wis.	10.45		6.91		13.39	.86
66	Oshkosh, Wis.	9.88	.50	5.52		15.67	1.69
67	Newport, Ky.	8.86	.26	8.53		5.26	2.56
68	Williamsport, Pa.	9.42		4.97		12.48	1.13
69	Pueblo, Col.	11.02	.20	8.00		6.83	2.29
70	Council Bluffs, Iowa	6.17	.77	5.96		16.73	.12
71	New Britain, Conn.	5.46	.82	6.23		10.28	3.51
72	Cedar Rapids, Iowa	6.45	1.10	6.68		8.97	2.27
73	Lexington, Ky.	15.66	1.01	12.03	.02	9.53	1.80
74	Bay City, Mich.	14.55	.72	8.92		10.68	.24
75	Fort Worth, Tex.	7.15	.30	7.62		8.78	.53
76	Easton, Pa.	7.40		6.35		9.12	.40
77	Gloucester, Mass.	11.37		7.88	.20	9.53	1.83
78	Jackson, Mich.	9.03	.95	8.16		13.32	.91

[1] For explanations concerning the derivation of this table, see p. 74.

expenses devoted to each of the itemized purposes. Average for the fiscal 25,000 and 50,000 population

Miscellaneous Public Safety.	Charities and Corrections.	Public Highways.	Municipal Lighting.	Public Sanitation.	Schools.	Libraries, Museums, etc.	Public Recreation.	General.	Corporate Interest.	Service Transfers.	
	4.21	4.83	7.85	10.65	21.70	.63	.24	.84	14.28	.03	1
.35	2.64	3.86	5.51	6.86	37.05	1.02	.47		8.13		2
	7.82	7.02	3.90	4.39	26.66	1.36	1.23		14.32	3.36	3
.33	.05	4.89	8.28	6.00	33.02	1.35	3.06		8.83		4
06	3.30	7.79	8.08	1.48	37.05	1.73	.60		6.89		5
	3.23	14.37	3.93	3.62	36.05	1.07	.32		12.05		6
	.24	6.63		1.33	28.50	.98	2.01	1.92	35.70		7
	3.10	4.44	6.41	6.11	24.70	1.20	.03		20.37	.08	8
	.54	12.26	13.95	5.97	32.32		.13		8.64	.09	9
	3.85	12.18	5.50	3.63	22.80	.81	.74	.29	20.85		10
	.10	3.26	4.06	2.81	40.80	1.46	.02		24.77	.08	11
	8.69	9.98	4.53	5.28	25.06	1.66	.40	1.24	12.81	2.52	12
.28	2.94	9.25	5.61	4.27	23.75	1.33	.47		25.06	2.61	13
.08	1.94	10.96	3.60	4.14	13.72	.04	.63		28.57	.31	14
	3.88	9.03	2.27	1.71	30.30		1.21		3.48	1.18	15
	1.71	8.48	1.74	1.77	29.65	.48	1.60	3.60	25.83		16
.84		8.28	5.09	2.95	38.40				20.25	.02	17
No data for schools.											18
.30	13.35	9.30	9.12	2.79	31.90	.001	1.03		6.73		19
No data for schools.											20
.31		7.61	7.35	5.22	32.30	1.13	2.15	.48	11.65	.05	21
	1.68	4.88	7.84	6.12	33.67	1.71			9.15	.58	22
.05	2.81	4.00	12.43	7.98	31.90	1.38	1.96		10.23		23
.20	4.71	11.85	6.44	.001	47.05		.55		6.87		24
.05	13.62	10.40	6.61	2.31	25.76	2.24	1.71	.07	12.50	.27	25
	.56	9.86	3.72	1.60	41.76	1.22	.61		12.36		26
.16	.51	2.69	7.71	5.59	39.35	.73	.49		4.41		27
.45	.10	8.19	7.45	3.39	42.88		.08		12.60		28
.30	1.20	5.96	6.23	3.79	35.43	.94			11.22		29
		8.09	7.22	4.56	29.98	1.33	.45		21.02		30
.02	.84	8.71	4.08	3.55	36.35	2.79	.05		6.20	.34	31
.18		9.42	8.16	7.79	37.10	.95	3.22		4.51		32
	1.96	4.79	7.13	4.20	29.56	1.52	2.69		18.05		33
.45	17.65	5.86	7.68	3.66	25.22	2.33	2.33		6.97		34
.02	3.95	9.95	8.77	2.37	25.75	.51	1.72	.02	11.33		35
	6.26	9.33	4.71	3.63	27.80	2.29	.42	14.72	11.26	.61	36
	.87	6.43	7.34	2.14	32.77	.87	.40		21.07		37
	1.79	9.87	3.65	1.30	36.45	1.40			3.42		38
.06	.70	9.19	9.03	7.59	37.55	.12	.79		8.84		39
	3.74	10.74	5.12	4.55	21.58	1.55	.65	9.43	20.69	.57	40
		13.91	4.04	2.03	33.75	1.00	.05		15.65		41
.70	1.13	3.68	7.29	3.70	28.11	.93	3.34	1.57	12.85	.01	42
	4.45	3.75	8.16	3.44	34.92		.80		13.75		43
.33	9.98	7.02	5.30	4.37	24.03	.92	.65	13.98	9.60	1.31	44
	11.79	11.35	6.82	3.07	26.28	1.59	.82	.32	13.35	.02	45
	3.59	6.39	8.37	3.52	19.75				25.54		46
	.73	6.88	9.10	5.85	40.70	3.43	.26		7.68		47
	.02	8.36	4.10	6.62	30.01	.68	.61		26.12		48
	2.10	7.78	5.41	3.43	12.87	.30	.79		34.25	2.43	49
.35	9.52	11.23	3.09	2.36	25.75	1.66	.71	.30	17.85	3.13	50
	5.97	7.95	1.17	3.67	47.25		.04		7.60		51
.15	3.86	6.90	6.82	3.98	37.77	1.50	1.77	1.31	9.76		52
.22	4.46	5.20	6.74	13.30	16.76	.54	.33	1.13	15.16		53
.32	1.19	3.53	8.69	6.92	35.79	.90	1.33	.12	14.79		54
No data for schools.											55
	8.85	5.69	1.77	7.64	20.25	.31	.30		22.95		56
	7.96	8.42	9.27	4.54	29.50	.62	.04		7.49	3.22	57
	4.17	13.27	5.28	.21	39.20	3.03	.03		8.00		58
	1.67	4.62	6.06	.18	40.17	.08	.17		16.31		59
	.74	10.30		.18	44.50	1.71	.01	1.60	6.95		60
.80	.79	7.12	7.47	6.63	38.42	1.91	2.00		6.17		61
.18	7.52	3.90	6.70	5.19	17.90	.16	2.03	.17	16.85		62
	5.75	10.09	5.91	3.68	20.57	.24	.09	3.15	22.27	2.99	63
.21	.36	12.60	8.05	8.39	35.30	2.46	1.20		2.33		64
.06	.06	5.23	5.79	3.17	39.27	.55	.31	6.59	7.48		65
	3.74	12.93	5.62	1.56	33.57	2.26	.78	.06	6.35		66
.09	3.54	6.09	6.94	5.22	26.04	1.44	.05		35.42		67
	8.09	6.24	7.56	2.25	35.94		.88		10.80		68
	.46	11.50	4.04	1.61	33.27	.80	3.81	.15	12.52	3.44	69
.26	.14	5.07	4.72	2.27	42.82	1.50	2.30		11.12		70
		6.30	6.19	6.04	38.26		.94		15.90	.06	71
	.01	13.65	6.53	3.57	38.45	1.90	1.84	.45	8.16		72
	8.64	5.38	7.82	2.60	22.30	.49	.06		12.65	.01	73
	.29	9.46		4.80	33.61	1.05	.57		15.18		74
.16	1.01	10.36	1.03	.76	18.45	.89	.33		37.15	5.41	75
		10.36	.39	2.60	50.87	1.15	.07		11.25		76
.18	13.38	13.39	3.80	.91	22.50		.40		13.78		77
.03	6.10	12.85	6.52	4.79	27.60	1.49	.50		7.49	.80	78

for police, department of inspection (other than health), and pounds.

4. Expenses for Militia.

5. Expenses for Fire Department.

6. Expenses for Health Department.

7. Expenses for Miscellaneous Public Safety. Not included under 2, 3, 4, 5, and 6.

8. Expenses for Charities and Corrections. Including expenses for poor in, and out, of institutions, children in, and out, of institutions, miscellaneous charities; expenses for hospitals, insane, prisons and reformatories.

9. Expenses for Public Highways. Including general management and engineering expenses, expenses for street paving, sidewalks, bridges, snow removal and street sprinkling.

10. Expenses for Street Lighting.

11. Expenses for Public Sanitation. Including expenses for street cleaning, refuse disposal, sewers, and sewage disposal.

12. Expenses for Public Education.

13. Expenses for Libraries, Art Galleries, and Museums.

14. Expenses for Public Recreation. Including expenses for parks and gardens, baths and bathing beaches, celebrations and entertainments.

15. Miscellaneous General Expenses.

16. Expenses for Interest on Municipal Obligations. Including only net corporate payments, which equal gross interest payments made to public, less the included accrued interest receipts from public.

17. Expenses for Service Transfers.

Transformation of Gross Itemized Expenditures to a Percentile Basis.—As in the former case, the first operation was to transform the gross itemized expenditures to a percentile basis. This was accomplished, though not without much tedious arithmetical labor, for the group of 75 [1] cities for the fiscal year 1902 and the fiscal year 1903. The percentile expenditures thus obtained were then averaged for the two years, item for item. These average percentile amounts are contained in Table 14.

[1] Three cities necessarily omitted from the total number of cities—78—on account of the absence of data.

XI. Supplementary Study of the Variability and Correlation of Municipal Expenditures—(Cont.)

As with Tables 1 and 2, a cursory examination of the percentile amounts in Table 14 reveals a very wide range of expenses in the identical municipal departments of the different cities. This variability is perhaps all the more noteworthy when it is recalled that the percentile amounts are for cities within a very narrow population range, and is confirmatory of the previous argument concerning the relation between variability and population.[1]

Table No. 15

Tables of frequency. Average percentile payments for general and municipal service expenses. All cities between 25,000 and 50,000 population. Fiscal years 1902 and 1903

Frequency	General Administration.	Police Department	Fire Department.	Public Highways.	Frequency.	Street Lighting.	Public Sanitation.	Charities and Corrections.
					Below 1	1	6	20
1					1	4	8	10
2			1	1	2	1	12	4
3			0	6	3	7	17	11
4		3	0	7	4	8	10	5
5	6	5	4	6	5	11	7	2
6	16	12	5	9	6	13	8	2
7	14	12	5	7	7	13	4	3
8	17	21	9	7	8	8	1	4
9	10	6	15	11	9	4	0	2
10	2	3	8	7	10	0	1	0
11	5	5	3	4	11	0	0	1
12	2	3	6	5	12	1	0	0
13	1	4	7	4	13	1	1	3
14	1	0	2	1	14			0
15	1	0	6		15			0
16	0	1	1		16			0
17	0		1		17			1
18	0		1		18			
19	0		1		19			
Total,	75	75	75	75		72	75	68

Tables of Frequency.—The data of Table 15 present the tables of frequency for each of the items of expenditure enumerated in Table 14, excepting courts, militia, miscellaneous public safety, general and service transfers. Expenses under these headings were given for but few of the cities, hence rendering useless for comparative purposes the presentation of the forms of distribution. These tables of frequency are to be interpreted in the same manner as the similar tables in the preceding portion of the study.[2]

[1] See p. 42.

[2] See p. 31; also note 2 of p. 31.

TABLE No. 15 (*Continued*)

Tables of frequency. Average percentile payments for general and municipal service expenses. All cities between 25,000 and 50,000 population. Fiscal years 1902 and 1903

Frequency.	Schools.	Frequency.	Libraries, etc.	Frequency.	Public Recreation.	Frequency.	Health.	Frequency.	Interest on Debt.
	Below .1		3	.1	13				
12	1	.1	2	.1	2	.1	2	2	1
13	1	.2	1	.2	2	.2	2	3	2
14	0	.3	2	.3	5	.3	1	4	2
15	0	.4	2	.4	8	.4	1	5	0
16	1	.5	3	.5	3	.5	2	6	8
17	1	.6	3	.6	6	.6	3	7	5
18	1	.7	1	.7	5	.7	2	8	6
19	1	.8	4	.8	3	.8	9	9	3
20	2	.9	6	.9	1	.9	5	10	3
21	2	1.0	4	1.0	1	1.0	2	11	5
22	3	1.1	2	1.1	0	1.1	4	12	8
23	1	1.2	2	1.2	3	1.2	3	13	3
24	2	1.3	5	1.3	1	1.3	1	14	3
25	5	1.4	4	1.4	0	1.4	4	15	4
26	3	1.5	5	1.5	0	1.5	3	16	2
27	2	1.6	2	1.6	1	1.6	3	17	1
28	2	1.7	3	1.7	3	1.7	2	18	1
29	4	1.8	0	1.8	1	1.8	2	19	0
30	2	1.9	2	1.9	1	1.9	5	20	4
31	2	2.0	0	2.0	3	2.0	0	21	2
32	3	2.1	0	2.1	1	2.1	3	22	2
33	6	2.2	3	2.2	0	2.2	5	23	0
34	1	2.3	1	2.3	2	2.3	0	24	1
35	4	2.4	1	2.4	0	2.4	0	25	4
36	3	2.5	0	2.5	0	2.5	2	26	1
37	5	2.6	0	2.6	1	2.6	0	27	0
38	4	2.7	1	2.7	0	2.7	0	28	1
39	3	2.8	0	2.8	0	2.8	0	29	0
40	3	2.9	0	2.9	0	2.9	1	30	0
41	1	3.0	1	3.0	1	3.0	2	31	0
42	2	3.1	0	3.1	0	3.1	0	32	0
43	0	3.2	0	3.2	1	3.2	0	33	0
44	1	3.3	0	3.3	1	3.3	2	34	1
45	0	3.4	1	3.4	0	3.4	0	35	1
46	0			3.5	0	3.5	1	36	0
47	2			3.6	0	3.6	1	37	1
48	0			3.7	0				
49	0			3.8	1	4.3	1		
50	1					5.2	1		
Total,	75		64		70		75		75

Figures 17 to 28, pp. 77–80, represent diagrammatically the form of the distribution of the percentile expenses for each of the items indicated in Table 15.

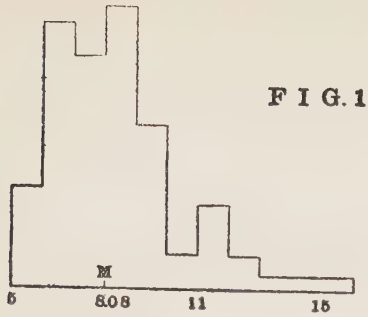


FIG. 17.

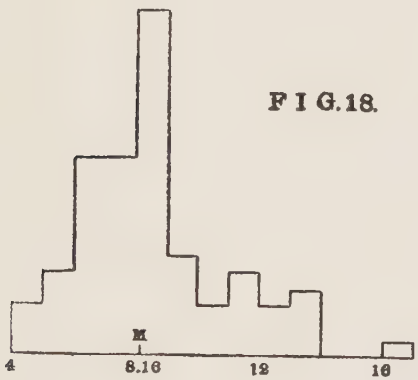


FIG. 18.

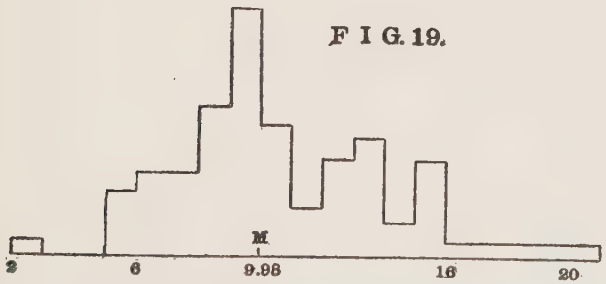


FIG. 19.

SURFACES OF FREQUENCY—PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. AVERAGE FOR FISCAL YEARS 1902 AND 1903. SEVENTY-FIVE CITIES BETWEEN 25,000 AND 50,000 POPULATION.

Fig. 17.	General Administration.	Median, 8.08.
Fig. 18.	Police Department.	Median, 8.16.
Fig. 19.	Fire Department.	Median, 9.98.

FIG. 20.

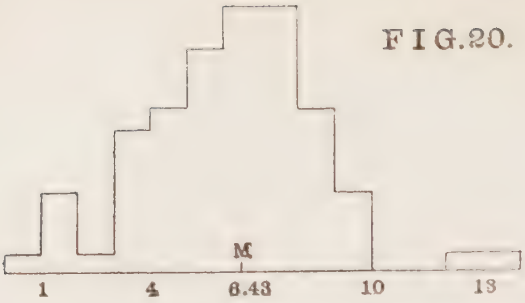
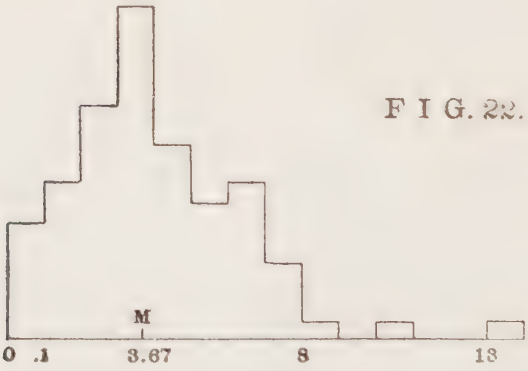


FIG. 21.

FIG. 22.



SURFACES OF FREQUENCY—PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. AVERAGE FOR FISCAL YEARS 1902 AND 1903. SEVENTY-FIVE CITIES BETWEEN 25,000 AND 50,000 POPULATION.

Fig. 20.	Street Lighting.	Median, 6.43.
Fig. 21.	Public Highways.	Median, 8.19.
Fig. 22.	Public Sanitation.	Median, 3.67.

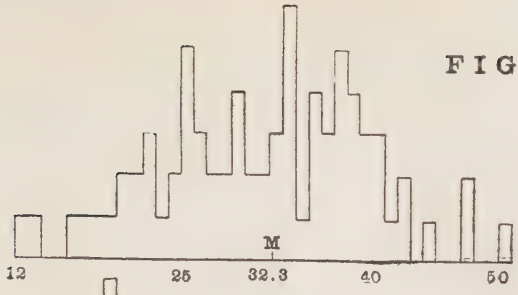


FIG. 23.

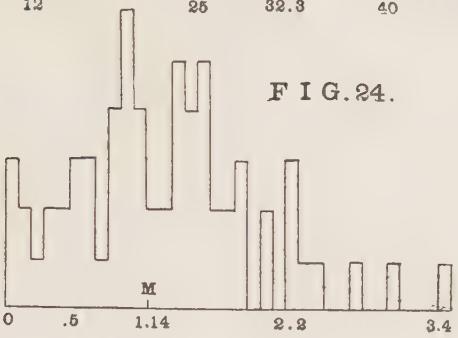


FIG. 24.

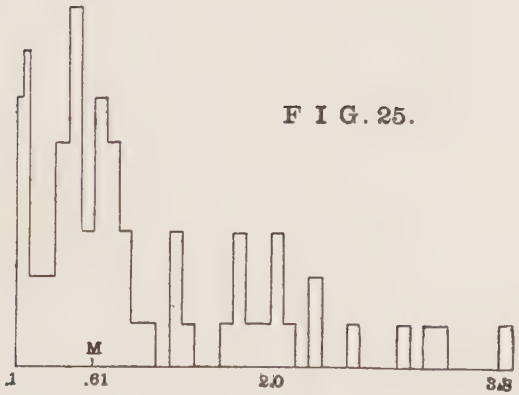


FIG. 25.

SURFACES OF FREQUENCY—PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. AVERAGE FOR FISCAL YEARS 1902 AND 1903. SEVENTY-FIVE CITIES BETWEEN 25,000 AND 50,000 POPULATION.

Fig. 23.	Schools.	Median, 32.3.
Fig. 24.	Libraries, etc.	Median, 1.14.
Fig. 25.	Public Recreation.	Median, .61.

FIG. 26.

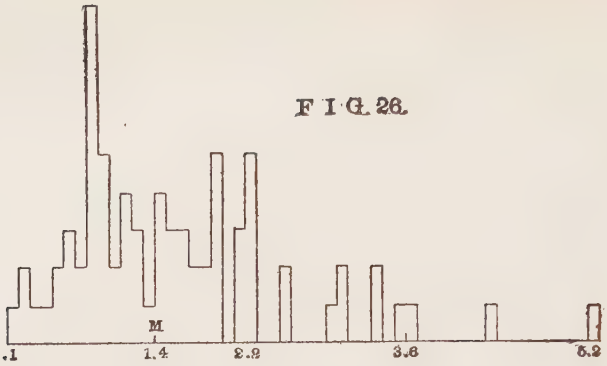


FIG. 27.

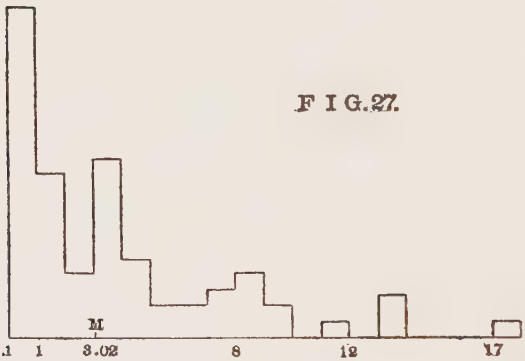
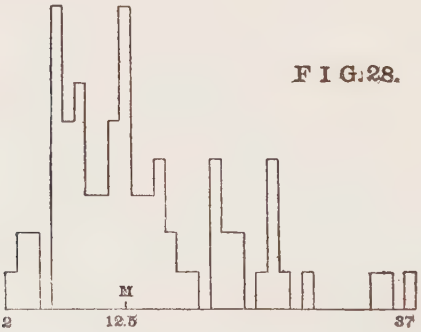


FIG. 28.



SURFACES OF FREQUENCY—PERCENTILE PAYMENTS FOR GENERAL AND MUNICIPAL SERVICE EXPENSES. AVERAGE FOR FISCAL YEARS 1902 AND 1903. SEVENTY-FIVE CITIES BETWEEN 25,000 AND 50,000 POPULATION.

Fig. 26.	Health Department.	Median, 1.4.
Fig. 27.	Charities and Corrections.	Median, 3.02.
Fig. 28.	Interest on Debt.	Median, 12.5.

Measurement of Variability; Probable Error.—Recalling the discussion in Section VI regarding the methods of determining the character of the variability exhibited by the different items, the following table will be self-explanatory:

TABLE No. 16

Table of measures of variability of percentile payments for general and municipal service expenses. Seventy-five cities between 25,000 and 50,000 population. Average of fiscal years 1902 and 1903

	Fifty percent of the cases lie between			2 P. E.
General Administration	6.76 %	and	9.24 %	2.48 %
Police Department	6.98	"	9.49	2.51
Fire Department	8.71	"	12.99	4.28
Health Department	.87	"	1.98	1.11
Charities and Corrections	.79	"	5.75	4.99
Public Highways	6.00	"	10.30	4.30
Street Lighting	4.10	"	7.71	3.61
Public Sanitation	2.37	"	5.22	1.85
Schools	25.75	"	37.10	11.35
Libraries	.73	"	1.55	.77
Public Recreation	.29	"	1.20	.91
Interest on Debt	8.13	"	15.99	5.86

Remembering the differences in the data used in deriving the percentile basis of Table 16 and of Table 4A, and keeping in mind the difference in the grouping of the cities concerned, the two sets of P. E. are scarcely comparable. Each set of data, however, serves as an index of the wide degree of variability which exists in municipal expenses.

Measurement of Variability—Deviation from Central Tendency.—As in the case of the statistics for 1900 and 1901, the variability of each item of expense has been measured by means of the amount by which each member of the group of cities deviates from the median of the group. The individual deviations, plus and minus, are reproduced in Table 17. From these individual measures it is possible to determine the character of the group variability in each item of expense in several ways. First, the *average* amount by which each city varies from the central tendency—in this case the median—of any item would give the average deviation, or A. D. Second, a more accurate statement of the preceding, viz., the square root of the average of the squares of the deviations from the median of any item of expense would give the so-called standard deviation for the entire group of cities. The average and standard deviations are presented in Table 18 for each of the different items of expense.

Medians, and deviations from medians, of percentile payments for general and municipal service expenses of cities in the United States having a population of 25,000–50,000. Average for fiscal years 1902 and 1903

No. of city.	General Administration.	Police Department.	Fire Department.	Health Department.	Charities and Corrections.	Public Highways.	Street Lighting.	Public Sanitation.	Schools.	Libraries, Museums, and Art Galleries.	Public Recreation.	Interest on Debt.	No. of city.
Median	8.08	8.16	9.98	1.40	3.02	8.19	6.43	3.67	32.30	1.14	.61	12.50	Median
1	3.46	3.71	− .76	.00	1.19	−3.36	1.34	6.98	−10.60	− .51	− .37	1.78	1
2	.13	5.25	− .06	1.16	− .38	−4.33	− .92	3.19	4.75	− .12	− .14	− 4.37	2
3	2.24	− .98	.68	.85	4.80	−1.17	−2.53	.72	− 5.64	.22	.62	1.82	3
4	−1.25	1.18	5.79	.71	− 2.97	−3.30	1.85	2.33	.72	.21	2.45	− 3.67	4
5	−1.44	− .11	7.02	− .36	.07	− .40	1.65	−2.19	4.75	.59	− .01	− 5.61	5
6	1.16	.38	−2.71	− .87	.21	6.18	−2.50	− .05	3.75	− .07	− .29	− .45	6
7	−1.63	−1.65	−1.25	− .58	− 2.78	−1.56	*	−2.34	− 3.80	− .16	1.40	23.20	7
8	3.20	2.09	− .88	.32	.08	−3.73	− .02	2.44	− 7.60	.06	− .58	7.87	8
9	− .31	1.92	−2.29	− .68	− 2.58	4.07	6.47	2.30	.02	*	− .48	− 3.86	9
10	− .42	1.74	1.04	−1.22	.83	4.09	− .93	− .04	− 9.50	− .33	.13	8.35	10
11	.00	−3.47	−1.28	− .58	− 2.92	−4.93	−2.37	− .37	8.50	− .32	− .59	12.27	11
12	1.29	− .72	− .78	.19	5.67	1.79	−1.90	1.61	− 7.24	− .52	− .21	.31	12
13	.78	− .06	−3.17	− .77	− .08	1.06	− .82	.60	− 8.55	− .19	− .14	12.56	13
14	− .56	4.16	3.47	− .57	− 1.08	2.77	−2.83	.47	−18.58	−1.10	.02	16.07	14
15	4.00	8.62	5.07	.56	.86	.84	−4.16	−1.96	− 2.00	*	.60	− 9.02	15
16	− .12	−2.81	.29	− .22	− 1.31	.29	−4.69	−1.90	− 2.55	− .66	.99	13.33	16
17	.85	−2.80	− .97	− .57	*	.09	−1.34	− .72	6.10	*	*	7.75	17
18	*	*	*	*	*	*	*	*	*	*	*	*	18
19	.61	− .54	−3.19	− .12	10.33	1.11	2.69	− .88	− .40	−1.13	.42	− 1.77	19
20	*	*	*	*	*	*	*	*	*	*	*	*	20
21	− .14	1.31	3.90	−1.11	*	− .58	.92	1.55	.00	− .01	1.54	− .85	21
22	.09	3.06	3.49	.07	− 1.34	−3.31	1.41	2.45	1.37	.57	*	− 3.35	22
23	− .20	− .59	− .99	.82	− .21	−4.19	6.00	4.31	− .40	.24	1.35	− 2.27	23
24	−1.98	.69	−4.09	.13	1.69	2.66	.01	−3.66	14.75	*	− .06	− 5.63	24
25	−1.79	−1.18	.00	− .43	10.60	2.21	.18	−1.36	− 6.54	1.10	1.10	.00	25
26	− .56	−1.40	1.54	.83	− 2.46	1.67	−2.71	−2.07	9.46	.08	.00	− .14	26
27	−1.71	.68	9.45	1.93	− 2.51	−5.50	1.28	1.92	7.05	− .41	− .12	− 8.09	27
28	− .99	−2.16	− .37	.70	− 2.92	.00	1.02	− .28	10.58	*	− .53	.10	28
29	1.82	3.02	.32	1.94	− 1.82	−2.23	− .20	.12	3.13	− .20	*	− 1.28	29
30	.35	.04	.10	− .79	*	− .10	.79	.89	− 2.32	.19	− .16	8.52	30
31	1.07	5.59	2.50	− .14	− 2.18	.62	−2.35	− .12	4.05	1.65	− .56	− 6.30	31
32	−1.48	− .82	3.54	− .53	*	1.23	1.73	4.12	4.80	− .19	2.61	− 7.99	32
33	−2.15	− .13	5.57	−1.04	− 1.06	−3.40	.70	.53	− 2.74	.38	2.08	− 5.55	33
34	− .88	.46	−2.41	2.21	14.63	−2.33	1.25	− .01	− 7.08	1.19	1.72	− 5.53	34
35	3.27	.02	2.92	.52	.93	1.76	2.34	−1.30	− 6.55	− .63	1.11	− 1.17	35
36	−2.99	−2.22	−4.30	.71	3.24	1.14	−1.72	− .04	− 4.50	1.15	− .19	− 1.24	36
37	1.38	4.97	−6.99	− .50	− 2.15	−1.76	.91	−1.53	.47	− .27	− .21	8.57	37
38	5.45	−1.28	8.39	1.58	− 1.23	1.78	−2.78	−2.07	4.15	.26	*	− 9.08	38
39	−1.55	.49	− .13	− .35	− 2.32	1.00	2.60	3.92	5.25	−1.02	.18	− 3.46	39
40	− .41	− .43	−4.84	− .53	.72	2.55	−1.31	.88	−10.72	.41	.04	8.19	40
41	.74	.56	.00	− .53	*	5.72	−2.39	−1.64	1.45	− .14	− .56	3.15	41
42	.47	3.59	5.50	− .55	− 1.89	−4.51	.86	.03	− 4.19	− .21	2.72	.35	42
43	1.16	1.14	−2.88	3.82	1.43	−4.44	1.73	− .23	2.62	*	.19	1.25	43
44	−2.30	− .24	−3.04	.29	6.96	−1.17	−1.13	.70	− 8.27	− .22	.04	− 2.90	44
45	−1.71	.15	−1.72	.08	8.77	3.16	.39	− .60	− 6.02	.45	.21	.85	45
46	.02	− .09	2.40	2.93	.57	−1.80	1.94	− .15	−12.55	*	*	13.04	46
47	−2.76	−1.16	2.09	− .73	− 2.29	−1.31	2.67	2.18	8.40	2.29	− .35	− 4.82	47
48	.00	−1.36	−2.60	− .56	− 3.00	.17	−2.37	2.95	− 2.29	− .46	.00	13.62	48
49	−2.03	4.91	−1.88	1.65	− .92	− .41	−1.02	− .24	−19.43	− .84	.18	21.75	49
50	−1.18	.55	−3.76	.50	6.50	3.04	−3.34	−1.31	− 6.55	.52	.10	5.35	50
51	.01	−1.41	.77	− .73	2.95	− .24	−5.26	.00	14.95	*	− .57	− 4.90	51
52	.88	−2.05	−1.26	− .04	.84	−1.29	.39	.31	5.47	.36	1.16	− 2.74	52
53	− .12	3.42	4.27	.27	1.44	−2.99	.31	9.63	−18.02	− .60	− .28	2.66	53
54	−2.20	.09	1.21	− .04	− 1.83	−4.66	2.26	3.25	3.49	− .24	.72	2.29	54
55	*	*	*	*	*	*	*	*	*	*	*	*	55
56	.46	1.62	2.17	.12	5.83	−2.50	−4.66	3.97	−12.05	− .83	− .31	10.45	56
57	1.30	−1.15	.54	− .48	4.94	.23	2.84	.87	− 2.80	− .52	− .57	− 5.01	57
58	−1.84	−4.03	4.16	− .21	1.15	5.08	−1.15	−3.46	6.90	1.89	− .58	− 4.50	58
59	4.08	−1.04	− .46	− .19	− 1.35	−3.57	− .37	−3.49	7.87	−1.06	− .44	3.81	59
60	.76	1.73	3.87	− .48	− 2.28	2.11	*	−3.49	12.20	.57	− .60	− 5.55	60
61	−1.16	2.13	− .49	.58	− 2.23	−1.07	1.04	2.96	6.12	.77	1.39	− 6.33	61
62	− .25	4.03	5.74	1.62	4.50	−4.29	.37	1.52	−14.40	− .98	1.42	4.35	62
63	−1.32	.08	−1.63	.39	2.73	1.90	− .52	.01	−11.63	− .90	− .52	9.77	63
64	.42	.74	− .32	− .28	− 2.66	4.41	1.62	4.72	3.01	1.32	.59	−10.17	64
65	2.37	−1.25	3.41	− .54	− 2.96	−2.94	− .64	− .50	6.97	− .59	− .30	− 5.02	65
66	1.80	−2.64	5.69	.29	.72	4.74	− .81	−2.11	1.27	1.12	.17	− 6.15	66
67	.78	.37	−4.72	1.16	.52	−2.10	.51	1.55	− 5.50	.30	− .56	12.92	67
68	1.34	−3.19	2.50	− .27	5.07	−1.95	1.13	−1.42	3.64	*	.27	− 1.70	68
69	2.94	− .16	−3.15	.89	− 2.56	3.31	−2.39	−2.06	.97	− .34	2.20	.02	69
70	−1.91	−2.20	6.75	−1.28	− 2.88	−3.12	−1.71	−1.40	10.52	.36	1.69	− 1.38	70
71	−2.62	−1.93	.30	2.11	*	−1.89	− .24	2.37	5.96	*	.33	3.40	71
72	−1.63	−1.48	−1.01	.87	− 3.01	5.46	.10	− .10	6.15	.70	1.23	− 4.34	72
73	7.58	3.87	− .45	.40	5.62	−2.81	1.39	−1.17	−10.00	− .65	− .55	.15	73
74	6.47	.76	.70	−1.16	− 2.73	1.27	*	1.13	1.31	− .09	− .04	2.68	74
75	− .93	− .54	−1.20	− .87	− 2.01	2.17	−5.40	−2.91	−13.85	− .25	− .28	24.65	75
76	− .68	−1.81	− .86	−1.00	*	2.17	−5.04	−1.17	18.57	.01	− .54	− 1.25	76
77	3.29	− .28	− .45	.43	10.36	5.20	−2.63	−2.76	− 9.80	*	− .21	1.28	77
78	.95	.00	3.34	− .49	3.08	4.66	.09	1.12	− 4.70	.35	− .11	− 5.01	78

* No data given in Table 14.

Measurement of Variability—Coefficient of Variability.—Were the question asked, which one of the items of expense varied most, no satisfactory deduction could be made based upon the different measures of variability just discussed. Does the expense for general administrative purposes vary more than the expense for police service? that for schools more than that for libraries? that for health more than that for fire protection? It could not be concluded, for instance, though the expense for general administration varies in the group of cities under consideration from 5.09 % to 15.66 %—a difference of 10.57 %—and while the expense for police service varies from 4.13 % to 16.73 %—a difference of 12.65 %—that the degree of difference between the two variabilities is that represented by the difference between 12.65 % and 10.57 %, or by the ratio existing between these two quantities. Neither would the declaration be sound that the difference in variability in the expense for schools and that for libraries is the difference in their gross variability or the ratio that the quantity of one variability bears to the other.

TABLE NO. 18

Table of medians, average deviations, standard deviations, and coefficients of variability. Average percentile payments for general and municipal service expenses. Fiscal years 1902 and 1903. Cities between 25,000 and 50,000 population

	Median.	Standard Deviation.	Average Deviation.	Coefficient of Variability.
General Administration....	8.08	2.06	1.54	.54
Police Department.....	8.16	2.38	1.74	.609
Fire Department.....	9.98	3.31	2.58	.817
Health Department.....	1.40	.997	.747	.633
Charities and Corrections..	3.02	4.04	2.98	1.71
Public Highways.....	8.19	2.99	2.52	.908
Street Lighting.....	6.43	2.35	1.84	.725
Public Sanitation.....	3.67	2.43	1.78	.927
Schools.....	32.30	8.34	6.67	1.175
Libraries.....	1.14	.727	.56	.524
Public Recreation.....	.61	.92	.642	.814
Interest on Debt.....	12.50	7.79	5.75	1.62

Without entering upon the discussion of the *rationale* of the mathematical procedure involved, it may be said that the so-called coefficient of variability [1] does give an adequate and comparable figure which may serve as an index of the degree of

[1] See Thorndike, E. L., *Mental and Social Measurements*, pp. 98–102, especially p. 102.

variability to which the different items of expense are subject. Developed according to an empirical formula,[1] these coefficients of variability are given in the fourth column of Table 18. From these coefficients it is justifiable to say that the expense for libraries and that for general administration seems to be least subject to the influence of those conditions likely to produce variability, while the expense for charities and corrections, and interest on debt, and schools, possess, in the order named, the largest degree of variability.

Causes of Variability.—The probable causes of the variability of expense discussed at length in Section VII. seem to admit of application in the present instance. Especially significant appears to be the negative influence of population alone. Of the remaining possible causes previously posited, the only one demanding special mention here is that of the mode of classification of public accounts and of systems of accounting. It is believed that the efforts of the Bureau of the Census to present the data of municipal finance in a manner at once in accord with the standards of economists and of public and private finance, and admitting of some degree of comparison, have resulted more successfully than any other previous efforts in this direction. The care and thoroughness employed by the officials of the Census in the preparation of adequate schedules and in the collation of the data would seem to indicate that the confusion arising from the varying systems of accounting and from the differing modes of classifications of public accounts had been reduced to a point which gives the data special value for such *group* studies as this.

Relationship of Variabilities; Coefficient of Correlation.[2]—Developed in the same manner as in Section VIII, the following coefficients of correlation given in Table 19 have been arrived at upon the basis of the average payments for municipal expenses for 1902 and 1903.

There seems to be no need of analyzing the implication of these correlations. What was said in Section VIII regarding the meaning of these relationships finds additional proof in the

[1] $V = \frac{\text{A. D.}}{\sqrt{\text{Median}}}$

[2] See pp. 56 ff. for discussion of significance and mode of derivation of the coefficient of correlation.

character of the present coefficients. Each series presents in general the same distinguishing marks (compare Tables 10 and 19). Noteworthy is the identity of the positive correlation of the expense for schools with the expense for fire department, that for libraries and museums and that for street lighting.

TABLE NO. 19

Table of Pearson coefficients of correlation. Average percentile payments for general and municipal service expenses. Fiscal years 1902 and 1903, all cities between 25,000 and 50,000 population

Schools with—	
General Administration	−.094
Police Department	−.367
Fire Department	+.088
Health Department	−.187
Charities and Corrections	−.371
Public Highways	−.000428
Street Lighting	+.246
Public Sanitation	−.246
Libraries and Museums	+.30
Public Recreation	−.054
Interest on Debt	−.541

XII. RELATIONSHIPS OF THE DIFFERENT STANDARDS OF EXPENDITURES FOR EDUCATION

Classification of Cities on the Basis of Percentile School Expenditures.—The previous demonstrations regarding variability and relationships of municipal expenditures have provided us, it is thought, with a new instrumentality with which to gain an insight into the significant meanings of these expenditures. We are enabled to classify cities into groups according to their differing fiscal characteristics. Thus, it is possible to arrange all of the cities, whose expenditures have been considered, into groups according to whether they spend a large or small proportion of their total municipal expenditures for any particular item. Such groupings on the basis of percentile educational expenditures as have already been represented [1] give additional meanings to our coefficients of correlation and lend further significance to the phenomenon of variability.

Tables 20(*a*), 20(*b*), and 21 present certain other fiscal characteristics of *groups* of cities, the members of each group being selected, in tens, from the extremes of the variability range of percentile school expenditures. Without additional comment,

[1] See Fig. 11, and explanation, p. 60.

it may be noted that the totals (averages and medians) of the various items of expenditure tend to confirm the general relationships pointed out by the Pearson coefficients of correlation. Other groupings on this same basis could be made so as to include all of the cities. A confirmation of the general tendencies indicated by the coefficient figures might be looked for, although, as groups were formed of cities lying close to the central tendencies of the expenditures, the previously marked differences in the group characteristics would tend to disappear.

TABLE No. 20 (*a*)

Table showing general group relationships. Selection of cities based on percentile expenditures for schools, and made from all cities in United States having a population of 30,000 and over. Fiscal year 1901

Highest ten cities in percentile school expenditures:

No. of City.[1]	Schools.	Street Lighting.	All Street Expenditures except Lighting.	Interest on Debt.	Fire Department.	Police Department Courts, Jails, etc.
111	46.8	8.26	7.05	12.80	4.57	8.18
87	44.16	7.20	3.21	5.69	10.86	9.27
114	38.80	2.79	9.02	5.08	7.30	7.65
81	42.49	5.40	7.48	14.50	8.21	10.90
38	41.40	6.14	9.81	7.43	7.50	8.13
56	40.90	8.74	8.17	3.26	10.50	9.99
113	39.74	8.46	4.95	13.52	8.04	5.58
75	38.80	10.80	12.22	6.56	9.66	9.71
100	38.41	4.99	6.43	2.79	14.44	15.54
119	37.69	11.32	7.77	9.70	6.85	10.18
Median,	41.15	7.73	7.62	6.12	8.12	9.85
Average,	41.42	7.41	7.61	8.13	8.79	9.51

Lowest ten cities in percentile school expenditures:

37	15.40	5.40	14.43	17.60	10.00	11.10
43	14.32	6.48	8.74	12.31	10.11	12.15
17	13.90	4.48	6.76	27.61	6.70	11.71
5	13.07	3.60	11.65	15.49	5.87	13.17
99	12.30	4.18	7.36	28.91	9.28	14.34
68	12.76	4.49	6.64	25.66	7.94	14.78
12	11.12	5.03	3.69	18.60	6.20	6.24
133	10.26	5.54	8.80	30.85	7.84	11.45
46	9.83	2.71	8.02	29.78	7.34	8.60
80	6.96	1.96	11.80	29.45	5.52	7.29
Median,	12.53	4.49	7.06	28.26	7.59	11.58
Average,	11.99	4.39	8.49	23.63	7.68	11.08

[1] For names of cities see Table 2, pp. 22–25.

TABLE NO. 20 (*b*)

Table showing general group relationships. Selection of cities based on percentile expenditures for schools, and made from all cities in United States having a population of 30,000 and over. Fiscal year 1901

Second highest ten cities in percentile school expenditures:

No. of City.[1]	Schools.	Street Lighting.	All Street Expenditures except Lighting.	Interest on Debt.	Fire Department.	Police Department Courts, Jails, etc.
118	36.90	8.92	6.01	12.80	6.22	9.90
2	36.85	3.62	4.82	6.80	7.40	17.66
59	36.70	6.65	5.27	6.88	10.90	7.43
129	36.06	7.21	10.83	8.33	9.94	6.25
25	35.93	4.86	9.07	7.09	8.22	9.08
90	35.66	11.02	8.33	9.90	6.13	6.43
93	35.30	10.20	7.64	4.30	5.98	6.94
77	35.20	7.54	9.03	12.80	4.47	6.83
84	34.93	5.88	8.25	7.93	8.49	11.45
132	34.70	4.47	11.03	6.66	7.59	13.24
Median,	35.79	6.93	8.29	7.50	7.50	8.25
Average,	35.82	7.04	8.03	8.35	7.53	9.52

Second lowest ten cities in percentile school expenditures:

85	18.24	3.17	9.02	22.32	9.28	7.79
10	18.12	5.48	6.19	27.94	7.59	11.07
94	17.91	4.58	2.67	18.99	10.11	12.07
30	17.87	4.83	7.88	12.88	7.66	6.59
135	17.85	2.41	9.59	18.30	13.26	12.31
34	17.73	2.10	7.69	8.02	6.79	7.79
4	17.51	6.72	7.72	8.93	8.82	13.17
3	17.37	6.46	5.45	7.48	5.76	22.36
24	16.98	7.72	5.92	16.14	7.43	6.60
98	16.48	6.59	12.27	13.35	8.60	15.26
Median,	17.79	5.15	7.71	14.74	8.13	11.57
Average,	17.61	5.01	7.44	15.43	8.53	11.50

[1] For names of cities see Table 2, pp. 22–25.

TABLE NO. 21

Table showing general group relationships. Selection of cities based on percentile payments for schools, and made from cities in United States having a population of 30,000 to 50,000. Average for fiscal years 1902 and 1903

Highest ten cities in percentile school expenditures:

No. of City.[1]	Schools.	General Administration.	Police Department.	Fire Department.	Health Department.	Charities and Corrections.	Public Highways.	Street Lighting.	Public Sanitation.	Libraries, Museums, etc.	Public Recreation.	Interest on Debt.
76	50.87	7.40	6.35	9.12	.40		10.36	.39	2.60	1.15	.07	11.25
51	47.25	8.09	6.75	10.75	.77	5.97	7.95	1.17	3.67		.04	7.60
24	47.05	6.10	8.85	5.89	1.53	4.71	11.85	6.44	.01		.55	6.87
60	44.50	8.84	9.89	13 85	.92	.74	10.30		.18	1.71	.01	6.95
28	42.88	7.09	6.00	9.61	2.10	.10	8.19	7.45	3.39		.08	12.60
70	42.82	6.17	5.96	16.73	.12	.14	5.07	4.72	2.27	1.50	2.30	11.12
26	41.76	7.52	6.76	11.52	2.23	.56	9.86	3.72	1.60	1.22	.61	12.36
11	40.80	8.08	4.69	8.71	.82	.10	3.26	4.06	2.81	1.46	.02	24.77
47	40.70	5.32	7.00	12.07	.67	.73	6.88	9.10	5.85	3.43	.26	7.68
59	40.17	12.16	7.12	9.52	1.21	1.67	4.62	6.06	.18	.08	.17	16.31
Median,	42.85	7.46	6.76	10.18	.87	.73	8.07	4.72	2.44	1.46	.13	11.19
Average,	43.88	7.68	6.94	10.78	1.08	1.63	7.83	4.80	2.26	1.51	.41	11.75

Lowest ten cities in percentile school expenditures:

1	21.70	11.54	11.87	9.22	1.40	4.28	4.83	7.85	10.65	.63	.24	14.28
40	21.58	7.67	7.73	5.14	.87	3.74	10.74	5.12	4.55	1.55	.65	20.69
63	20.57	6.76	8.24	8.35	1.79	5.75	10.09	5.91	3.68	.24	.09	22.27
56	20.25	8.54	9.78	12.15	1.52	8.85	5.69	1.77	7.64	.31	.30	22.95
46	19.75	8.10	8.07	12.38	4.33	3.59	6.39	8.37	3.52			25.54
75	18.45	7.15	7.62	8.78	.53	1.01	10.36	1.03	.76	.89	.33	37.15
62	17.90	7.83	12.19	15.72	3.02	7.52	3.90	6.70	5.19	.16	2.03	16.85
53	16.76	7.96	11.58	14.25	1.67	4.46	5.20	6.74	13.30	.54	.33	15.16
14	13.72	7.52	12.32	13.45	1.97	1.94	10.96	3.60	4.14	.04	.63	28.57
49	12.87	6.05	13.07	8.10	3.05	2.10	7.78	5.41	3.43	.30	.79	34.25
Median,	19.10	7.75	10.68	10.69	1.73	4.01	7.09	5.66	4.35	.31	.33	22.61
Average,	18.36	7.91	10.25	10.75	2.02	4.32	7.59	5.25	5.69	.52	.60	23.77

[1] For names of cities see Table 14, pp. 72–73.

Classification of Cities on the Basis of Per Capita School Expenditure.—In like manner Table 22 illustrates the construction of groupings from the per capita expenditures which, even more than the percentile groupings, give objective evidence of the conditions predicated by the Pearson coefficients:

TABLE No. 22

Table showing general group relationships. Selection of cities based on per capita expenditures for schools, and made from all cities in United States having a population of 30,000 and over. Fiscal year 1901

Highest ten cities in per capita school expenditures:

No. of City.[1]	Schools.	Police Department, Courts, Jails, etc.	Fire Department.	Street Lighting.
132	$5.56	$2.12	$1.22	$ .72
60	5.53	1.04	1.50	1.03
1	5.51	3.21	1.32	.76
122	5.43	1.94	1.55	1.59
5	5.31	3.13	2.24	1.34
25	4.85	1.23	1.11	.66
41	4.67	1.37	.97	.77
61	4.64	1.04	1.02	.92
49	4.62	1.56	1.42	.72
120	4.62	.98	.99	.87
Median,	$5.08	$1.46	$1.27	$ .82
Average,	5.42	1.76	1.41	.84

Lowest ten cities in per capita school expenditures:

125	$1.49	$ .65	$ .66	$ .71
135	1.47	1.02	1.10	.20
126	1.46	.56	.53	.62
46	1.35	1.18	1.01	.37
37	1.31	.95	.93	.46
99	1.24	1.45	.93	.42
68	1.19	1.38	.74	.42
98	1.18	1.02	.62	.47
133	1.12	1.26	.86	.61
80	1.07	1.12	.84	.30
Median,	$1.27	$1.07	$ .85	$ .44
Average,	1.29	1.08	.85	.44

Fiscal Standards for Education.—After all, it may be asked, what is the real significance of these relationships and groupings? Unless they are indicative of certain positive or negative qualities of municipal activity, why develop them? In the general

[1] For names of cities see Table 2, pp. 22–25.

attempt to make a reply to this, we are led to discern if possible the relationships which may exist between the different expenditure standards in current usage. In this the effort will be confined to the different standards of educational expenditures, inasmuch as these are the factors which are of most concern in the present instance.

Classification of Cities on Basis of Cost per Pupil.—The ordinarily accepted standard for effort in the support of public education is the amount expended according to the number of pupils educated; in general, the annual cost per pupil educated, based on average daily attendance. This seems to be, of course, the sound basis. If expenditures are in any way related to efficiency and excellence and opportunity, then the actual amount of money devoted to each pupil attending school is the most essential fiscal fact. A city does not educate in its public schools all of the population, hence a rating on the basis of expenditure *per capita of population* would not be entirely sound, except in so far as the number of children in cities bore a constant relation to the total population. Even the number of children in a community is scarcely an index of the number of pupils in the public schools. Many within the age limit do not attend school for one reason or another. Private and parochial schools tend to reduce the number of pupils actually in the public schools.

Valuation of Different Standards.—In spite of this apparent proof of the validity of the *cost per pupil* basis, it is here thought that each of the several classifications, *percentile*, *per capita* and *per pupil*, has a special value in estimating potential municipal effort and actual educational opportunity afforded in any city. The difficulty has been in actual administrative practice, not in the lack of recognition of these different standards, but in the assignment of an adequate value to each.

Relationship of Different Standards.—Before suggesting any method by which this possible value may be attached to each of these standards, it is necessary to determine in some way just what relations these different standards bear to one another. Are they totally independent, or does the knowledge of one give any information concerning the others? To present the problem in a more definite manner, Table 23 has been constructed. The first three columns of the table (omitting the column giving

the index numbers of the cities) give the rankings of the 135 cities above 30,000 population, for the fiscal year 1900 according to the three standards which have been indicated.

The rankings of the first column were obtained by arranging the cities according to their percentile expenditures for education, giving to the city that spent the highest percentage, of its total expenditures, for education rank 1, to the city that spent the second highest percentage rank 2, etc. In a similar manner, the cities in column two were ranked according to their per capita expenditures. The figures for column three were obtained in an arbitrary yet uniform manner, from the data published in the report of the United States Commissioner of Education for 1899–1900,[1] by dividing the combined expenditures for teaching and supervision, and current and incidental expenses, by the average daily attendance. As this data is gathered by the Commissioner of Education directly from the school superintendents, it is, without doubt, fairly reliable.

From a casual inspection of these columns one might easily infer the existence of a positive correlation between columns two and three. That such a mutual relationship is present is indicated by Figure 29. It is of such a direct and conclusive nature that no attempt was made to measure its exact amount by the Pearson coefficient.

The relations between columns one and three and one and two are of a neutral or slightly negative character. This is demonstrated graphically in Figures 30 and 31, which represent the relations as they exist between the cities of from 30,000 to 50,000 population.

Value of Percentile Standard.—In view of these negative or neutral relationships between the rankings according to the percentile standard and those according to the other two, what estimate may be put upon this standard? It serves indeed, as we have already seen, as a means of determining with considerable accuracy the exact fiscal position of public education in its relation to other municipal activities. These relationships enable us to state specifically certain characteristics of fiscal

[1] Vol. II, Table 7, pp. 1798–1809, *Statistics of Population and School Enrollment and Attendance in Cities over 8,000 Population*, 1899–1900; Table 10, pp. 1832–1841, *Statistics of Expenditures of Public Schools of Cities over 8,000 Inhabitants in 1899–1900.*

TABLE NO. 23

Rank of cities in the United States above 30,000 population in accordance with expenditures for education

No. of City.[1]	Percentile Rank, Expenditures of 1900.	Per Capita Rank, Expenditures of 1900.	Cost per Pupil, Rank, 1899–1900	Weighted Values.	Weighted Rank.	Weighted Rank, Excluding Southern Cities.	Total Expenditures, Maintenance and Operation. Per Capita Rank.
1	122	6	4	282	15	111	3
2	30	25	20	235	10	29	73
3	113	87	83	902	103	104	36
4	115	90	80	900	101	106	37
5	119	4	7	285	16	109	2
6	120	104	66	882	97	110	40
7	66	70	52	602	61	65	66
8	96	56	64	680	72	92	26
9	88	24	6	278	14	86	21
10	110	57	87	826	93	101	17
11	125	88	24	634	63	112	12
12	130	125	50	885	99		47
13	64	71	51	596	60	63	69
14	86	93	90	901	102	84	65
15	79	19	25	340	22	77	20
16	102	33	28	443	32	98	13
17	127	105	108	1109	119	113	10
18	105	96	104	1018	114		51
19	53	32	72	562	56	52	49
20	106	20	10	322	20	100	8
21	23	54	33	373	28	22	96
22	49	64	32	450	34	48	71
23	97	82	89	885	100	93	46
24	117	34	38	526	48	108	6
25	9	7	11	94	2	9	63
26	50	68	101	809	90	49	75
27	111	89	70	839	94	102	41
28	74	58	40	522	46	73	50
29	82	9	22	301	19	80	7
30	78	22	61	527	49	76	25
31	48	39	53	478	39	47	57
32	56	72	88	768	84	55	79
33	104	75	75	808	89	99	39
34	40	129	98	957	109	39	132
35	54	26	29	331	21	53	48
36	25	11	30	233	9	24	56
37	118	127	114	1187	122		111
38	1	55	41	372	27	1	126
39	58	48	19	355	24	57	52
40	75	52	56	586	58	74	44
41	84	5	18	273	13	82	5
42	71	84	34	564	57	70	68
43	123	122	128	1252	126		72
44	41	61	82	675	70	40	78
45	26	46	36	370	26	25	85

[1] For names of cities, see Table 1, pp. 18 ff.

TABLE No. 23 (*Continued*)

Rank of cities in the United States above 30,000 population in accordance with expenditures for education

No. of City.[1]	Percentile Rank. Expenditures of 1900.	Per Capita Rank. Expenditures of 1900.	Cost per Pupil. Rank, 1899–1900	Weighted Values.	Weighted Rank.	Weighted Rank. Excluding Southern Cities.	Total Expenditures. Maintenance and Operation. Per Capita Rank.
46	129	123	125	1252	127		45
47	90	114	122	1232	125		49
48	98	78	16	510	43	94	43
49	62	17	1	180	4	61	27
50	42	101	118	977	112	41	112
51	51	108	99	921	105	50	113
52	59	103	107	962	111	58	100
53	87	115	109	1064	115	85	103
54	69	99	102	927	106	68	86
55	101	35	44	527	55	97	14
56	8	10	13	111	3	8	70
57	85	81	71	768	85	83	85
58	93	36	43	509	42	90	22
59	3	12	65	367	25	3	88
60	47	3	23	218	8	46	11
61	52	8	49	373	29	51	18
62	100	100	45	725	78	96	59
63	63	63	39	510	44	62	60
64	29	66	58	546	54	28	106
65	99	113	35	712	76	95	76
66	61	67	60	623	62	60	64
67	32	47	54	475	38	31	82
68	126	128	132	1296	132		81
69			No data				
70	34	13	55	382	31	33	54
71	76	111	119	1080	118		101
72	83	18	14	290	17	81	15
73	28	86	42	524	47	27	115
74	91	110	112	1072	117	88	90
75	4	85	96	743	80	4	124
76	43	79	124	446	107	42	92
77	22	76	85	697	74	21	116
78	112	31	31	472	37	103	9
79	67	16	5	207	7	66	23
80	132	131	120	1257	128		29
81	6	27	21	198	6	6	108
82	44	14	12	190	5	43	42
83	38	102	97	867	96	37	114
84	15	73	91	699	75	15	119
85	107	106	116	1112	120		62
86	95	109	47	752	81		83
87	35	60	59	545	53	34	89
88	108	119	123	1188	123		84
89	16	40	105	687	73	16	95
90	24	121	79	806	88	23	130

[1] For names of cities, see Table 1, pp. 18 ff.

TABLE NO. 23 (*Continued*)

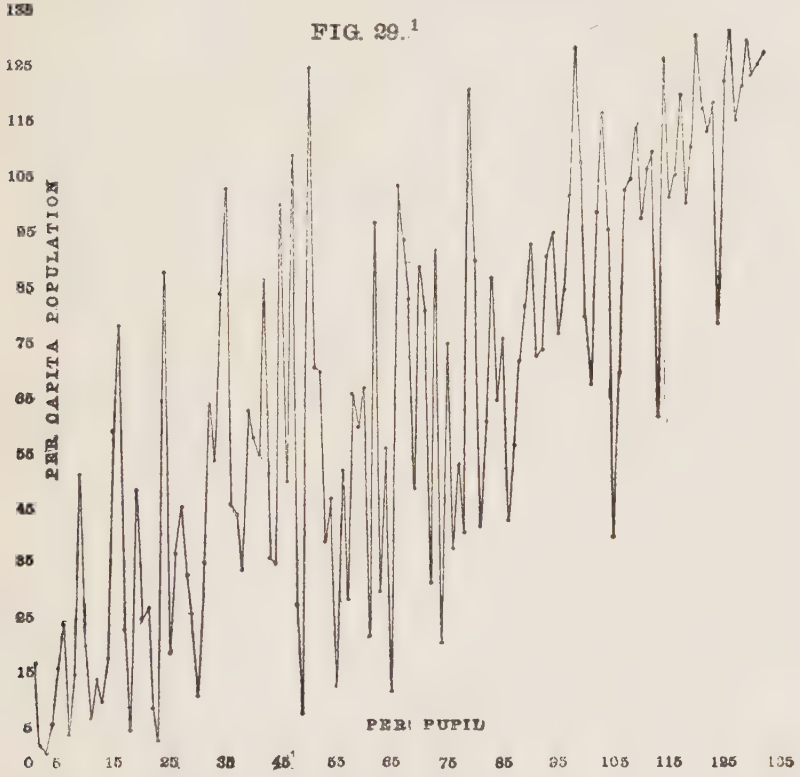
Rank of cities in the United States above 30,000 population in accordance with expenditures for education

No. of City.[1]	Percentile Rank. Expenditures of 1900.	Per Capita Rank. Expenditures of 1900.	Cost per Pupil. Rank, 1899–1900.	Weighted Values.	Weighted Rank.	Weighted Rank. Excluding Southern Cities.	Total Expenditures. Maintenance and Operation. Per Capita Rank.
91	18	65	84	651	67	18	110
92	92	49	69	676	71	89	28
93	10	41	78	533	51	10	104
94	109	116	127	1201	124		77
95	114	59	15	480	41	105	19
96	21	107	111	917	104	20	127
97	57	92	73	755	82	56	87
98			No data				
99	124	130	129	1283	130		107
100	20	112	115	951	108		128
101	39	80	100	818	91	38	99
102			No data				
103	128	50	46	636	65	114	4
104	81	44	37	479	40	79	32
105	89	51	9	376	30	87	35
106	13	28	48	350	23	13	91
107	37	74	92	758	83	36	98
108	46	117	103	958	110	45	123
109	27	97	62	655	69	26	121
110	94	45	27	458	36	91	24
111	2	91	93	741	79	2	129
112	73	69	106	883	98	72	61
113	11	98	110	866	95	11	125
114	5	21	74	443	33	5	102
115	33	95	94	821	92	32	117
116	36	77	95	778	86	35	105
117	55	42	81	641	66	54	53
118	19	94	67	655	68	19	122
119	12	118	121	983	113	12	131
120	77	15	8	239	11	75	16
121	14	43	86	587	59	14	97
122	116	2	2	254	12	107	1
123	45	53	77	634	64	44	67
124	72	23	17	298	18	71	30
125	103	126	131	1143	121		118
126	60	120	117	1065	116	59	120
127	80	37	26	451	35	78	31
128	70	29	57	512	45	69	34
129	17	62	113	785	87	17	109
130	68	30	63	541	52	67	38
131	31	38	76	556	55	30	80
132	7	1	3	32	1	7	33
133	131	132	126	1288	131		55
134	65	83	68	719	77	64	74
135	121	124	130	1264	129		93

[1] For names of cities, see Table 1, pp. 18 ff.

practices in cities. Alone, the percentile standard of expenditure tells us to just what extent it is *necessary* for the municipality to support education, or to what extent the municipality is *willing* to support education, or to what extent it is *able* to

FIG. 29.[1]



support education. Necessity, willingness, and ability may represent different things entirely. The percentile expenditure may be comparatively low, yet the per capita and cost per pupil expenditures high (compare city 122 in the tables). In this case the possible number of pupils may be comparatively low and the general resources of the community comparatively high. In either case, it would be necessary to make use of the per capita or cost per pupil rankings and standards.

Value of Per Capita Standard.—The closeness with which this standard approximates that of the cost per pupil in any

[1] See p. 91 for explanation.

city might be indicative, in general, of the extent to which the facilities for public education were utilized by all of the children of the community. Any great divergence would indicate some cause which led to an unbalancing of the normal proportion of children and adults in the population, or it might indicate a non-attendance of pupils upon the public schools.

Value of Cost per Pupil Standard.—Without entering upon any detailed discussion as to the validity of the method by

TABLE No. 24

Table of frequencies. Expenditure per pupil for schools. Derived from data contained in report of the United States Commissioner of Education, 1899–1900

Cost per pupil.	All cities above 30,000 population.	All cities between 30,000 and 50,000 population.
$11	1	0
12	0	0
13	1	1
14	2	2
15	4	2
16	3	1
17	3	2
18	1	0
19	3	3
20	6	3
21	8	3
22	12	7
23	7	2
24	16	10
25	5	2
26	12	2
27	5	3
28	7	1
29	9	0
30	5	2
31	5	1
32	6	3
33	2	0
34	3	2
35	0	0
36	1	0
37	1	1
38	2	1
39	1	1
40	0	
41	0	
42	1	
	Total, 132	55

which this factor should be derived, and assuming that, in general, a high cost per pupil is indicative of a high standard of opportunity for education, it may be asserted that, in ranking cities in accordance with their fiscal policy toward educa-

FIG 30[1]

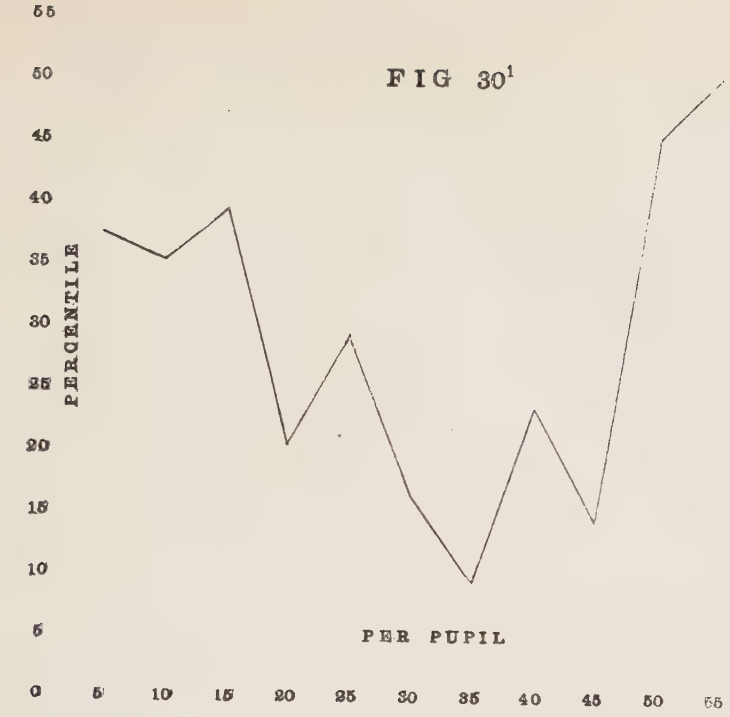
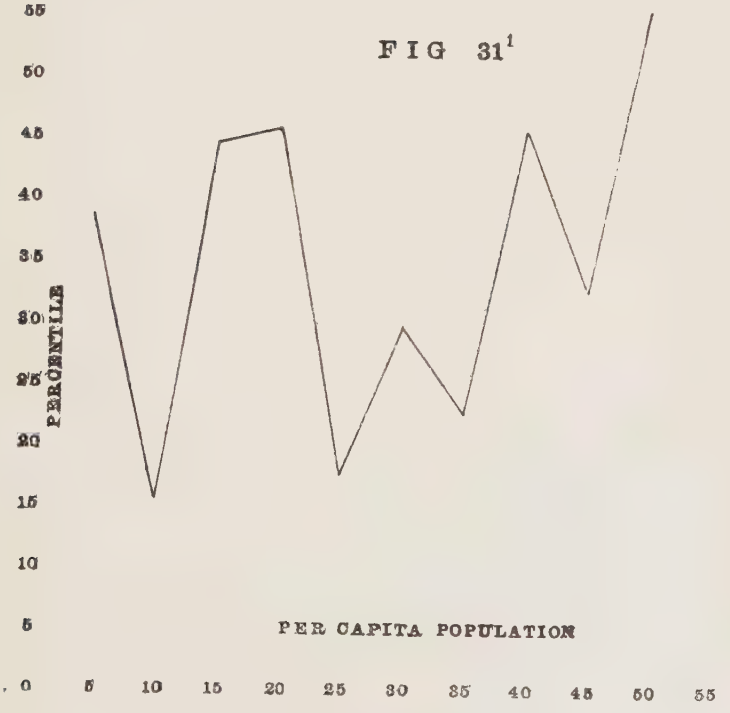


FIG 31[1]



[1] See page 91 for explanation.

tion, the greater weight should be given to this factor. In the present rankings a small number of discrepancies may have arisen by ranking some cities too high, owing to such causes, as, for instance, an extraordinarily high expenditure for secondary education, which would tend to raise the cost per pupil rank above that obtaining in reality by the average expenditure for all pupils.

Rankings According to Weighted Values.—Columns four and five of Table 23 are suggested as a possible method by means of which communities could be given a financial rank for their educational expenditures, by assigning certain values to the three previously discussed standards. Column four was developed by assigning a value of *two* to the rankings of column one, a value of *three* to those of column two, and a value of *five* to those of column three. The cities were then ranked in accordance with these weighted values, to the lowest value being given the first rank. The plan here followed is one that might be adapted on a more extended scale, including, for instance, such items as the percentage of the total amount expended for education devoted to the salaries of teachers, the proportional amounts devoted to elementary and secondary education, and so forth. By reason of the generally low position of the southern cities, a ranking according to the weighted values is given in column six of Table 23, excluding the southern cities.

In the last column of this table all of the cities are ranked in accordance with their total municipal expenditures on the per capita basis. The relation between the per capita expenditures for education and the per capita total expenditures, as determined by the Pearson formula, gave a result of + .56. This coefficient is to be interpreted as meaning that, as the general municipal expenditures increase, the expenditures for education do not increase at the same rate. In this respect this coefficient seems to indicate a similar tendency to that derived from the relation between the amount of school expenditures and the assessed valuation of property in cities.[1]

XIII. General Conclusions

Aside from the detailed results of this study recorded in the preceding chapters, it seems pertinent to gather together here

[1] See page 66.

some of the larger and wider aspects of the method used and of the results obtained.

The validity of the application of such a statistical method as that employed cannot, I believe, be questioned. The study of the financial statistics of education, through the medium of large groups of cities needs no further justification, if such statistics are to be raised above the plane of mere *one to one* comparison of cities and are to be utilized for general scientific conclusions.

The study of the expenditures for public education with reference to the expenditures for other municipal activities should be extended until the relationships between all of these different expenditures can be defined and their meaning fully understood. As cities increase in size, and the extent, number, and importance of municipal functions increase, thus bringing a greater burden to the sources of the municipal income, there will develop a greater necessity for a knowledge and understanding of these relations, both for a fuller recognition of the essential conditions of municipal life and for a better comprehension of the legitimate claims of public education for a more generous support.

The finances of public education in a municipality cannot be studied apart from the finances of other activities any more than the public school as an institution can be studied in isolation from its social environment. The wider consideration of this important matter will lead to two much-desired results.

First, there would be a tendency toward the breaking down of that social and administrative isolation of the public schools which now obtains in so many communities. The idea of the unity of the municipal life and institutions brought forward in the introduction of this study will be furthered only when the mutual dependence of the social activities within that life is realized. Without doubt there is a grave danger in not having the public schools of all cities safeguarded against the attacks of vicious politics and self-seeking prejudices. But politics and prejudices of this sort exist in a greater or less degree in every community. Merely to keep the public schools free from their influence is not to protect the remaining elements of the municipal life. Each of these elements possesses a potential power for education. Each should be entitled only to such proportion

of the public revenue as is demonstrated by its efficiency and importance within the municipal economy.

Second, there would result a broader conception of the economic importance of education, which would serve to supplement a rational treatment of those fundamental and far-reaching problems of financial support at present confronting the educational activities in most American cities. The fiscal relationships that have been pointed out are of the variety demanded for a correct discrimination of the rightful quantity of public support to which each of the municipal activities is economically entitled.

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AFTERWORD

It is fitting at the conclusion of this study for me to express my gratitude to those whose assistance has made its accomplishment possible. To Dean James E. Russell of the Teachers College, Columbia University, for suggesting the importance of such a study, and to Professor Edwin R. A. Seligman of the Faculty of Political Science of Columbia University for much helpful advice during the progress of the investigation, am I under deep obligations. By Mr. Le Grand Powers, Chief Statistician of the

Division of Wealth, Debt and Taxation, of the United States Census Bureau, for much valuable information regarding the collection of the original data utilized; by Professor S. T. Dutton of the Teachers College, Columbia University, for his interest in the study; and by Dr. F. A. Cleveland of New York City for many useful hints regarding the nature of municipal accounts, have I been placed under a lasting debt. For the opportunity of making an extended observation of current municipal reports, I am indebted to the auditors and treasurers of a large number of cities, especially to these officers of New England and New York cities. In this connection, too, Dr. James H. Canfield, Librarian of Columbia University, has given me timely aid in the collection of municipal reports from many other cities. Much kindly assistance has been rendered me by Miss Elizabeth G. Baldwin and Miss Anna E. Scudder of the Bryson Library, Teachers College. Without the inestimable and painstaking assistance of Miss Jeanette F. Seibert, Assistant in Psychology in the Teachers College, in the lengthy and laborious work involved in the arithmetical and tabulating operations, the study would have been beyond the limits of my energy and patience.

It is, however, to Professor Edward Lee Thorndike of the Teachers College, Columbia University, that I must acknowledge my greatest debt. His interest in the problems developed during the course of the investigation, and the constant, kindly criticism of the work, especially as regards the statistical method employed, have caused me to be keenly sensible of the gratitude I owe him. It is the inspiration derived from his scientific attitude toward all social and educational problems that has given my work whatever merit it may possess.

PERSONAL STATEMENT

The author of this study was born in Chicago in 1874. He received his elementary and secondary education in the public schools of North Platte, Nebraska; was graduated from the University of Nebraska with the degree of bachelor of science in 1895; master of arts, 1897. He was a Fellow (Teaching) in Chemistry at the University of Nebraska, 1895–1897; instructor in science, High School, Leadville, Colorado, 1897–98; and superintendent of city schools, Leadville, Colorado, 1898–1903.

He was a student at Columbia University, 1903–1905; and at University of Jena, summer semester, 1905; assistant in educational administration, Teachers College, Columbia University, 1903–1904; Fellow (Teaching) in Education, Teachers College, Columbia University, 1904–1905.